

SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE
OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION
FOR THE ADVANCEMENT OF SCIENCE.

FRIDAY, JANUARY 18, 1907

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THE PRESENT AND FUTURE OF THE AMERICAN CHEMICAL SOCIETY¹

IN view of the far-reaching changes in our society that are to inaugurate the new year now at hand, it seems to me that no more fitting subject for an address on this occasion could be chosen than one which should present to our members a statement of its present condition, the reasons for the changes undertaken, the importance of these changes to all the chemists of North America, and the need of the loyal support of our present membership at the start in securing the structure of the greater edifice upon a firm and enduring foundation, so that a powerful organization may develop for building up the profession—an organization that shall be fully worthy of what may become, as has been predicted, the future stronghold of chemistry. This presentation seems specially called for at this moment, since the existing situation and what it is hoped to accomplish by the proposed changes are not fully known to a large proportion of our members, particularly that portion that is remote from the larger industrial and educational centers and unattached to our local sections. And

¹ Address of the president of the American Chemical Society, New York meeting, December, 1906.

since the future develops from the present, and it is the future, though inseparable from the present, that holds most of interest for us now, I will call my theme 'The Present and Future of the American Chemical Society.'

The desirability of assembling all chemists in a single strong organization would seem so manifest as to be beyond the need of argument for its support, and the whole drift of the present address will conform to this postulate. In the words of a correspondent, "If the profession of chemistry is to reach and maintain the distinguished position which it ought to have in this country, it must do so by presenting a united front and combining in its membership practically all who are engaged in any branch of chemical work." And again, "A person who joins the American Chemical Society should not have in view solely his personal interests. He should first have in view the interests of the profession. His membership is a patriotic duty and not a personal perquisite."

But without specialization few advances would be made. Specialized societies are, therefore, excellent and to a certain degree necessary—and to this point I will revert later—but it would seem as if they would be most effective as adjuncts of a major organization which should include all chemists. It is a mistake to think, as some apparently do, that the chemist in one line of work has little to learn from those laboring in different fields. All owe their success to the application of the same fundamental facts and theories, and discovery in one field may have most important bearing at a point seemingly remote. Deep specialization is vital and inevitable; but he who while performing his own particular task at the same time endeavors to keep in touch with the general trend and progress of the important work in his profession will be in advance of the man who reads

none but his own special journals and waits for the text-books and manuals to bring him the belated knowledge which might have been his much sooner.

The foregoing lines were written long before the opening of the new Harvard Medical School on September 26 of this year, and it was, therefore, pleasing to read in the address of Dr. Wm. H. Welch, delivered on that occasion, the following expression of his opinion: "Specialization * * * is demanded by the necessities of the case and has been the great instrument of progress, but the further division is carried, the more necessary does it become to emphasize essential unity of purpose and to secure coordination and cordial cooperation of allied sciences." This was said with particular reference to the many specialized branches of medical science.

Again, from the same address: "How disastrous may be to medicine the loss of the sense of unity in all its branches has been clearly and admirably shown by Professor Allbutt in depicting the effects which for centuries followed the casting off from medicine of surgery as a subject unworthy the attention of the medical faculty. Thereby internal medicine lost touch with reality and the inductive method, and remained sterile and fantastic until the day of Harvey, Sydenham and Boerhaave."

That the application of these statements to our own profession will be self-evident to most of its followers is my hopeful belief.

Such a general organization as that alluded to, broad in its scope and progressive in its administration, not only maintains and adds to the dignity of the profession at large, but also helps the individual in more ways than one. The opportunities which it affords by its general meetings for seeing, hearing and becoming acquainted with the foremost men in all lines of work appertaining to the profession, are

not to be had elsewhere. The chances for young men to become known of their fellows are equally good. The young member may, it is true, at his first or second attendance, feel somewhat lost and out of place, but if his countenance is seen frequently, and especially if he soon presents a paper of merit, he becomes known, makes acquaintances wherever he wishes, and derives from scientific conversation and social intercourse with his fellows the full and stimulating benefit these meetings are intended to afford. I know of few greater satisfactions than the talks over problems and difficulties with a worker along like or kindred lines, all the more, perhaps, if he chance to be a new acquaintance. Narrow-mindedness and intolerance are evils which are mitigated by rubbing up against one's co-workers and finding out their different points of view. The suggestions and helps to be given and received constitute benefits to be derived from these meetings whose value is properly appraised by those who know how to profit by them, but is by too many, unfortunately, much underestimated. The older men can contribute greatly to the success of such gatherings if they come prepared to meet more than half way the perhaps diffident approaches of the younger generation and ready to part freely with information and hints drawn from their long experience. I believe this is the spirit in which most, if not all, of the older men do come to these meetings, but the younger ones must be reminded that although their seniors may have the best will in the world to help, they can not possibly do so unless they know who need help. Therefore, the younger members must not be backward about making themselves and their wants known.

In all of these ways the reorganization of the American Chemical Society in 1890-3 did much to forward the cause of chemistry in our country, aside from pro-

viding an organization representative of the profession and a medium worthy of respect at home and abroad. The low dues which it seemed necessary to levy at the start and the lack of an endowment fund, however, made it impossible to provide the needed detailed information in all branches, even in the form of abstracts relating to the advances of chemistry in the world at large. It was possible to cover only the home field, and that not fully until 1902. Notwithstanding that this field has been well covered in the main since that date, the inability to offer more has been a most serious obstacle to the full development of the society, one which, if allowed to operate too long, must inevitably lead to its deterioration and eventual disintegration. For our members all need to know what is being done abroad. Through our own inability to afford this knowledge, they must seek it in foreign publications, which, besides covering the foreign field, give accounts of much of the work originating here. If our members have not access to certain public libraries or to those at educational centers, their only recourse is to subscribe at considerable expense to other publications than that of their own society. To the young worker, this additional sum, while absolutely inconsiderable, is sufficient oftentimes to turn the scale of his indecision in favor of the foreign publication or society as against the local one which patriotism would naturally lead him to prefer. The result has been that while our society has continually prospered and increased numerically, until its membership now exceeds 3,000, making it perhaps the third among existing chemical societies, it has failed to attract to itself anything like the number that properly should be attached to it. The total number of chemists in this country is probably fully double that enrolled in our membership. It has even been placed at 8,000. Of these some,

but by no means the larger number, belong to other organizations. Very many are unattached. For one reason and another, we have failed to attract these, most of whom are unquestionably connected with the technical industries. And it is among these technical members of our society that a spirit of discontent has been most pronounced. Numerically they constitute probably a majority of its membership. That this discontent should exist particularly among technical men is not surprising when we consider the conditions under which they work as compared with those of the educators and their students. The latter either possess themselves, or have access to, all or much of the world literature that they need; the former are far less favorably situated in this respect, and it is to them of the utmost importance that their society should provide through its publications the power to meet all ordinary emergencies and to rise above provincialism.

The spirit of discontent to which I have referred has been manifest for some years. It has not been due altogether to the want above specified, but is in part chargeable to certain other conditions to which I shall refer later. It has manifested itself thus far in the formation of new and independent societies of specialists and in the growth of others already existing. The fact that these organizations have come into being and find continued support and that new ones are contemplated is evidence in a general way that they are needed, or that our own society does not offer all that it should. For the best interests of the profession at large, however, it seems very unfortunate that its power for good should be diminished by degrees in this way, for it is undeniable that for chemistry as a whole much more can be accomplished through union of all chemists than through many independent organizations, some

weak, few strong, the weaker ones fated to a hard struggle and destined to accomplish unaided far less than they might as members of a strong general organization.

As a first step toward improving the situation, it was early recognized that we should endeavor to provide for our members complete abstracts covering the whole range of chemical literature.

In the matter of chemical abstracts taken as a whole throughout the world, it has long seemed to many that there was an excessive waste of valuable time, labor and money, in their preparation. The same work is repeated in several languages and sometimes more than duplicated in a single tongue. Cooperation on an international scale, each country preparing its own abstracts and exchanging with other countries through a sort of clearing-house bureau, would obviously be the ideal solution of the problem, but quite as obviously an ideal that would meet with difficulties too great to be overcome at one stroke. It would be simpler to begin by securing cooperation between English-speaking countries, and earnest efforts on our part have been put forth with this end in view during the past few years. It is unnecessary to follow here the steps taken, or even to outline the tentative propositions formulated and urged, chiefly by our editor. Suffice it to say that success was not achieved, and it became clear that we should have to rely on our own unaided efforts and add to the existing duplication of abstracts if we wished to approach the ideal in our publications and make them of value to all chemists.

This end is attainable with sufficient money at command and with the right minds to plan and organize. The last condition is more readily met than the first, without which, however, success is beyond reach. Recognizing this clearly, the council a few years ago directed the appoint-

ment of a committee on endowment fund, which should canvass the situation and endeavor to devise means for the creation of a fund to aid the abstract project without rendering necessary any, or, at any rate, a great increase in the society's dues. The committee's efforts have thus far been without effect.

Less than a year ago one of our technical chemists wrote me with regard to the feeling and attitude of industrial chemists towards our society. The letter was decidedly pessimistic in tone, and the writer claimed to voice a feeling which was only partially justified by the facts as to some of the causes of dissatisfaction enumerated, and one or two of its statements were founded on misapprehension. It contained, however, much food for thought, coming as it did from one claiming to know the sentiment in his section of the country among men in the technical industries, who constitute, as before said, probably the larger part of our membership. Inquiry in various directions, chiefly in the large industrial centers, confirmed the charges in their main features and showed the existence of a wide-spread feeling that demanded immediate recognition.

The council directed the appointment of a committee of six technical chemists, with the president as an additional member and chairman, which should reduce to specific terms the wishes of this large body of men, so far as they could be ascertained, and present them for consideration to the council at the Ithaca meeting. This was done. The committee was selected with a view to securing the advice of men prominent in the technical branches, men of acknowledged reputation, some of whom had been active in expressing dissatisfaction with existing conditions, yet supposedly open-minded men of ideas, able and willing to look at the question fairly from all sides and hence free from narrow prejudice.

The committee consisted of the following members in addition to the chairman: G. E. Barton, Geo. D. Chamberlin, A. D. Little, J. D. Pennock, T. J. Parker and W. D. Richardson. It may be said that the bringing together for this purpose, from widely separated parts of the country, chiefly from the great industrial centers, of men representing varied industries, has been and will be productive of good results in more ways than one. By interchange of views among themselves, and by conversation with others, they were enabled to ascertain the feeling in different sections of the country, and by contact with the governing body in one of its sessions, any possibly preconceived opinions regarding the hostility of that body or of individuals in it toward the technical side of the profession surely became dissipated. They were able to return to their homes and to disseminate a truer view of the situation than had before existed.

Before taking up the recommendation of the committee it will be well to review in detail some of the causes of discontent that were found to exist, as well as portions of the discussion arising from their presentation.

These were mainly set forth in the letter from the correspondent above referred to and related almost entirely to the character of the *Journal*. It may be said at the start that in the search for complaints, almost no objection was raised to the contents of this publication. It was freely admitted that what it contained was of good quality and there was little, if any, complaint that worthy matter had ever been rejected. The opinion was held in some circles that much of the matter emanating from government laboratories and experiment stations, which finds duplication in national and state publications, might be omitted in favor of matter less favored in this respect. The chief criti-

cism related to omissions. It was held that probably the majority of the society membership followed the technical industries and, therefore, should receive an even share of consideration in the make-up of the *Journal*, whereas by far the larger space was devoted to contributions from, or of chief interest to, those outside the technical branches.

As a corollary to this criticism, it was maintained that the technical side of the profession was inadequately represented in the governing body of the society, and quite as much, if not more so, in the control of the *Journal*.

It would seem that the remedy for this alleged lack of due representation in the council lies largely in the hands of the complainants. It is well known that a sufficient number of votes in nomination of councilors from local sections or of councilors at large to entitle the candidates to recognition in the final ballot, can be procured only by prior agreement among a considerable number of members to unite upon certain suitable persons. As this agreement is most readily reached where many members live in close proximity, it follows that the larger sections can and do exercise a controlling influence in the choice of councilors at large. Most of the larger sections are located at centers of great industrial activity, and industrial chemists doubtless constitute a majority of their membership. The remedy is, therefore, apparent, if unison in choice is attainable. It must be borne in mind, however, that in order that good ultimate results should follow concerted action of this kind, no spirit of class feeling should be allowed to dominate in selections made either on the part of technical members or of those following science in the fields of education or pure research. The spirit of broad fraternity should have free play and both sides should be willing to recognize the rights of the

other and to select from the ranks of either the most deserving, irrespective of their particular fields of work and without seeking merely numerical preponderance. It goes without saying that the present dominating influence of one side in the council, so far as numbers go, has not been the result of intention, but has come about mainly from natural conditions. Several of the local sections are located at centers of educational activity where relatively few members are industrially engaged, the result being that educators naturally represent those sections in the council. In this connection, the policy should in general be consistently followed of electing as councilors at large those who through their works have become widely and favorably known to the profession, thus reserving these positions as rewards for repeated achievements of a high order.

The written discussion brought about by the above reference to the paucity of original contributions from technical chemists deserves some consideration by itself.

The original critic asserts that the controlling class, composed of professors and government and experiment station chemists, finds its needs fully met by a journal of the "type of that of the London Chemical Society and feels that the admission of most other matter would be lowering the grade of the journal, while the other class needs a journal like that of the Society of Chemical Industry," and that 'the only way to retain the two classes of members is to give the publication a dual character' with separate editorial boards. Coupled with this latter suggestion is the question whether a somewhat different standard should not be applied in the consideration of papers submitted for publication, in order to meet the wants of a class of chemists doing routine work, to whom chemistry, in the words of several high in technical circles, is a 'trade, not a

profession,' whose chief demand is for 'methods and many of them' relating to their restricted work only, and who will not avail themselves of general literature, though it may be freely offered for their use. The problem as to this class is difficult, and one writer sees no solution 'except through a selected membership and increased cost of the *Journal*,' for 'printing more high-class technical papers would not help the matter much.'

A further quotation from the letter already mentioned may be given to show the feeling of the writer at the time, and, as he claims, of others, and as bearing on the question of a fair standard of excellence for papers submitted for publication. "If a man attains a chief professorship in a small college or a junior professorship in a large university, I doubt very much whether he has exhibited any higher ability than the technical chemist who maintains himself in a position where he has approximately the same number of assistants," a belief which is perhaps justified. He goes on to say: "Either a just scale of relative attainment must be recognized or two societies must naturally result, and I am convinced that the narrowness of a large portion of both the industrial and teaching chemists of the country will finally compel a separation, whatever is done. However, if an attempt is to be made to keep what is two societies in other countries in one here, I think that an independent committee composed of works chemists alone should be appointed to investigate the whole subject of inducements to works chemists to contribute to the *Journal* and to formulate general principles as to what should and what should not be considered high-class technical matter. * * * If the colleges would take the initiative and develop some plan of co-operation similar to that proposed by Mardick on pages 133-138 of the *Chemical*

Engineer for January, 1906, there would be more hope for the American Chemical Society getting along without a split."

It is doubtless true that the feeling of narrowness referred to in the foregoing extract exists to some slight degree among both educational and industrial chemists. There is among a small section of those connected with educational institutions a preference for a society based on a high-grade membership and this feeling finds its counter expression among some technologists who are so shortsighted as to think they have no need for the worker in non-technical lines. The feeling is, however, far less strong than it was a few years ago, and is destined, I think, to complete eradication. To this end, the best efforts of the conservative members of both classes should be persistently and strenuously directed. It should become the fixed policy of the society to foster cordial relations among its members and to manifest a spirit of the broadest liberality in the enactments of its governing body. At the same time, those engaged in industrial pursuits must always remember that although they equal in number the educators and their students, or may even form a majority of the society, it is none the less true that the former are and no doubt will continue to be the greater producers of new and original matter, and hence be deserving of greater consideration in proportion to their numbers than those who are less productive. It is the new in chemical science that makes possible industrial advance, therefore the fullest consideration should be shown those who by their discoveries in pure science may thus be laying the foundations for future industrial enterprises. It should be immaterial whether this comes more largely from one class of workers than from another.

On one point referred to in the discussion—that relating to the unwillingness of

some works chemists to avail themselves of opportunities offered them for acquiring a broader knowledge of their profession through its current literature—little need now be said. It is a situation that will ever exist so long as human nature remains what it is and educational institutions graduate low-grade men without other ambition than to earn a bare livelihood and unwilling to endure the arduous labor that must accompany earnest efforts to climb the ladder of success.

The question of applying a different standard for different classes of papers may also be left for the present. It is a point on which the committee on relations of the society to technical chemists made no recommendation. It is also a question of much delicacy, the solution of which will work itself out in the next few years, as the development and differentiation of the society's publications progresses.

The criticism that a majority of the articles appearing in the *Journal* of the society are of a non-technical character and that the educators and government chemists, through their control of the *Journal*, crowd out articles of a technical character, is as to the second point quite incorrect, and as to the first, open to a very simple and natural explanation. No article of merit has ever been intentionally declined by the committee on papers and publications, and those of a technical character have always been welcomed. It is possible that in a very few instances mistakes of judgment have been made, but this applies to papers relating to other lines of work as well as to those offered by industrial chemists. But even so, this is only an inevitable result of the fallibility of human judgment.

I have taken the trouble to tabulate the contents of the *Journal* for the eleven years preceding 1906, dividing the papers into three classes, namely, those relating to (1)

agriculture, biology, etc.; (2) pure chemistry; (3) analytical and applied chemistry. No two persons would prepare identical lists because of the difficulty in classifying many of the papers, especially those on the border between agriculture, biology, etc., on the one side, and applied science and analytical methods on the other; therefore, I will not reproduce the table. Its main features, however, may be indicated, confirmed as they are by those of a similar table prepared by the editor, but covering only the years 1895, 1900 and 1905. It is shown that the agricultural and biological branches taken together stand about where they did eleven years ago, without appreciable increase, so they need not be further considered. It is further shown that although the number of papers in analytical and applied chemistry has increased in the last semi-decade, there has been a marked decrease as compared with the number published eleven years ago, and that the increase in papers relating to pure chemistry has been very marked in the last four years, but had experienced no increase in the seven years preceding and had undergone but slight fluctuations during that period. It may be said that some of the papers in analytical and applied chemistry listed for 1895, the year of greatest productiveness in those fields, were quite brief and unimportant, yet there has evidently been an absolute decrease as to number, though perhaps an improvement in quality. Whether the decrease is in any way attributable to the application of a higher standard of requirement can not be determined with certainty. It is most likely that the chief cause is to be sought in the inducements offered by the columns of journals devoted wholly to the applications of chemical science. On the other hand, the marked increase in papers devoted to pure science, so called, finds its chief and natural explanation in the rapid

growth of our educational institutions and of the facilities for prosecuting research therein. This leads to a consideration of a further cause for the comparatively slight increase in technical papers in the last five-year period. The student and his instructor have absolute freedom in the matter of publication, subject to the one limitation of a satisfactory standard. The industrial chemist, on the other hand, is hampered and restricted by the unwillingness of most employers to make public the discoveries originating in their laboratories. This policy is apparently quite as firmly adhered to at the present day as in former times, and acts as a very real deterrent of publication of the work of chemists thus employed. Their discoveries are not their own property, and if made public often appear in the guise of patent specifications, in which are embodied the results of a vast amount of chemical work, much of which never gets into print in any other form. For this reason, such comparisons as are shown by the table above referred to may not be altogether fair to pure science. A just comparison should take account of the work embodied in the ever-increasing number of patents applied for. If this could be accurately determined, the ratio in the quoted table might not seem at all disproportionate. Nevertheless, there has been a marked disinclination on the part of many technical chemists to publish in our *Journal*, and this disinclination it is the purpose of the management of the society to remove if possible. How this is to be done will now be considered.

From the foregoing it is apparent that the chief cause acting against the fullest development of our society is the dissatisfaction of a large number of our technical members with present conditions, which chiefly relate to the *Journal* of the society.

The committee already referred to as having met at Ithaca last June for the

purpose of formulating the wishes of the industrial chemists, offered a number of suggestions which have already been published in the *Proceedings*, pages 57 and 58. These received the favorable consideration of the council, at whose deliberations the technical members of the committee were present by invitation, and they are in substance as follows:

1. That publication in full of all official methods adopted by official organizations the world over be made in the *Journal*.

2. That the present reviews, covering the general advances in chemistry, be continued.

3. That for the benefit of that class of technical chemists whose environment tends to cause them to regard chemistry as a trade rather than a profession, 'an attitude which can not fail to react unfavorably upon the individual and the profession at large,' something may be accomplished by the publication of high-class articles from recognized authorities, treating of the advance and outlook in the different fields of chemistry. These will differ from the reviews heretofore published and to be continued in that they shall deal with broad conclusions and the trend of thought, and be so written as to be of general interest and calculated to keep all members in touch with the more important developments in the different fields of chemical work.

4. That the foregoing articles shall be supplemented by other general statements, similar to those that have from time to time appeared in the *Journal*, showing the progress, from a chemical standpoint, of special industries. By endeavoring to obtain these through direct application to manufacturers' associations covering special industries, it is thought that closer cooperation between manufacturers and the society, of mutual benefit to each, might be secured.

5. That the whole field of chemistry the

world over be covered by abstracts, so far as the financial condition of the society will permit, and that to meet this extension an increase of dues be made, if necessary.

6. That an earnest effort be made to secure a greater number of technical papers from technical schools, with special consideration of the propositions of Mardick in this direction already referred to.

7. That the committee on papers and publications be increased by the addition of two technical chemists.

The last of these recommendations goes into effect probably with the coming year. Numbers 1-4 and 6 will doubtless be followed, as heretofore in the case of those already in operation, and gradually adopted in part if not wholly in the others. The remaining and most important recommendation, that for abstracts to cover the foreign as well as home field, had already been practically decided on by the council after careful review of the ground by the editor, and merits extended consideration.

Few, except those who have been in close touch with the working out of such an undertaking as an abstract journal to cover all languages, can realize the magnitude of the task, the multiplicity of points to be taken into account, and the results of neglect to pay due regard to matters that at first thought may seem to be of minor moment. First there was the form of publication to be considered—that is, should it conform to the model hitherto followed, or should the journal be divided into sections, each devoted to a special branch of chemistry and followed by the abstracts pertaining to that branch, or should a special abstract journal be issued; and whatever the decision in this regard, should the publication or publications be issued at monthly or semi-monthly intervals. Coupled with these matters were those relating to size of page and cover, color of covers and inserts, matter to appear on the several

pages of cover of one or both publications, advertising rates, subscription price, the drawing of specifications for the guidance of bidders and of a contract for the successful one.

While these questions were still under consideration a plan had to be carefully outlined for collecting and properly classifying the abstracts, involved in which were minor details of abbreviations to be used, both for titles of papers and of certain frequently appearing data in the text, of directions for the guidance of abstractors, etc. A list of journals, proceedings of societies and other publications must be carefully prepared and arrangements made to secure these by exchange or otherwise if the editorial office did not already have access to them. Then, most important of all, came the selection and securing of a competent staff of abstractors, with suitable men to take charge of special divisions and to be responsible for the work of those associated with them, for many fields are far too wide to be covered by a single man. This question was rendered specially difficult by the lack of eligibles who are acquainted with some of the less familiar foreign languages. Hence the need in a few instances of correspondence with distant lands in the hope of securing, if possible, some one there competent to attend to the publications of his land and able at the same time to write abstracts in English. A further element of difficulty here arose, that few, if any, are sufficiently at home in all fields of chemistry to be able to prepare satisfactory abstracts in them all, a difficulty which was also encountered in those cases where a competent man is available here at home for certain fields of work in a little known foreign tongue, but not in others, and the man for these others is not to be had. Often, too, appeared the need for finding some one in a particular city where alone, perhaps, certain publications

are to be had that are likely to contain matter of interest to chemists. Particularly is this true in my own field of mineralogy and geology. Very many of the publications to be drawn upon, if this field is to be properly covered, are accessible only in the city of Washington, and most of these only in the library of the geological survey.

It will thus be seen what a task devolved on the editor of the *Journal* when the publication of an abstract journal was decided on. The time will undoubtedly come when the society must employ, at a good salary, a man whose whole time can be devoted to editing the society's publications, for they will demand all of his time. An alternative would be to continue the present plan, but to relieve the editor of all but supervisory labor by furnishing him with adequately paid and competent assistants. As it is, the editor has been obliged to engage an associate to share with him the arduous labors that have fallen upon his shoulders. And here I can do no less than testify to the patient, unwearied efforts and painstaking care bestowed by Dr. Wm. A. Noyes in planning for the new publication. This I can do the more authoritatively from having been in active cooperation at close hand with him throughout the past year. He has been heartily aided in the way of advice on many knotty points by the members of the committee on papers and publications and the present corps of abstractors, as well as by others, but the great weight of the task has devolved upon him, and I trust that our members will give him due credit for what appears to them good in the results attained, and withhold judgment if there be defects. That there will be mistakes to rectify and omissions to make good is to be expected, for such an undertaking can not spring into full fruition at once; it must be given time to de-

velop; premature judgment must not be pronounced.

I will not present to you the divers reasons that influenced the decision of those in charge of the matter in their choice of the form the society's publications should take. The result has been made known to all. I will, however, briefly repeat that the *Proceedings* and *Journal* of the society will appear monthly as heretofore, and will include reviews of all kinds. The abstract journal, to be known as *Chemical Abstracts*, will issue semi-monthly and will be given up wholly to abstracts. These abstracts will naturally not be so full or so complete as is desirable, but the best will be done that our means allow and 'improvement' will be the watchword from year to year. It is altogether probable that we shall finish the first year or two with a deficit, hence the obvious need that our present members should stand by the society and endeavor to add largely to its numbers. A large proportion of our membership—that engaged in educational centers—has access to existing abstract journals covering all fields of work. They are hence, as a rule, in no special need of additional abstracts, and I wish my technical friends to bear this well in mind and to give due credit to these many members who, although their wants are largely met by existing conditions, have yet readily consented to an increase of dues and in many cases have taken on themselves the preparation of abstracts out of sheer loyalty and a desire that those who are less fortunately situated may reap the fullest benefit that the society can offer. I can not refrain from mentioning also the fact that in some quarters where at least indifference might have been looked for, not only was this feeling not apparent, but, on the contrary, the proposed changes excited a satisfaction, I might almost say, enthusiasm, that was in the highest degree encouraging.

I have said that while we shall aim to cover the whole field of chemistry, the work can not be done so fully or in such detail as we could wish, simply for the reason that our means are still insufficient. It will be necessary to condense in some fields, except as to articles that appear in less known languages and in the less accessible publications. Unimportant articles and those which relate to local matters of little or no general interest, or which are of a statistical nature, will receive but brief notice or be mentioned by title only. At the start, it will be impossible to cover the ground fully because of the enormous number of publications concerned and the inaccessibility of many of them. But as the undertaking becomes systematized and the society grows—and it is my firm belief that it will rapidly grow if the present membership gives it the loyal support asked for and thus supplies the means for development—the weak spots will be gradually mended. To adequately cover the ground, however, a far larger fund than that afforded by the increased dues must be available. If the present experiment is successful in accomplishing the ends aimed at, it is felt that we can go before the public that is able to give and ask for large contributions to a permanent publishing fund with far better grace and prospect of success than was possible before we had shown our willingness to help ourselves as far as circumstances permitted.

If the project for a Perkin Library in the city of New York, with its salaried staff, becomes a reality, it will help much to supplement a lack of fullness that our abstract journal may show, for many of our educational centers are weak in library equipment and very many of our industrial workers are far removed from libraries of any kind. It is proposed that the Perkin Library shall be in duplicate, so far as possible, so as to permit the loan-

ing of books to applicants in any part of the country, and also the furnishing of more detailed information as to the contents of any particular article or series of articles, which our abstracts might fail to afford.

Having thus outlined the somewhat critical situation in our society and the steps thus far taken to counteract tendencies fatal to the society's fullest development, let no one cherish the thought that other difficulties will not arise that will demand the most careful leadership. The chief of these, perhaps, can be readily foreseen, for it has already manifested itself in the formation of independent specialized societies. It is the belief of myself, and probably of many others, that this tendency is one which in itself should not be unduly restricted, but that it should be guided along lines most conducive to the welfare of all concerned, that is to say, the differentiation of the society into special sections should be regarded as a result desirable in itself because inevitable and therefore to be considered as a part of the general policy of the society, to be kept constantly in view and acted on as circumstances demand. In the opinion of most of our members, the time is not yet ripe to inaugurate such a policy, though circumstances have arisen which may make it highly desirable to begin very soon. Premature departure in this direction on a large scale, however, would be ill-advised and unsafe. The society must first be placed on a basis so firm and secure that success will be assured from the start. It is necessary to gather into our fold a much larger membership than we now have, and no step that we can take to bring about this increase will, in my opinion, be more effective than the formal expression by the society of its adoption of this intention as a cardinal article of its fixed policy. A natural result would be that existing spe-

cialized societies would in all probability consent to become members of the greater organization.

This consolidation of independent specialized societies is wholly in agreement with modern evolution and has been accomplished already in other fields. The American Medical Association is such an organization of affiliated societies of all branches of medicine, and arrangements are in progress not only to bring together in a similar union all the medical societies in London, but further to add to the number by the formation of new sections as occasion arises. The degree of independence to be accorded the subordinate sections may well be left to future determination, but some such plan as that proposed for the London societies seems entirely feasible and proper. According to this each section shall be self-governing as far as possible, and shall have direct representation in the general council and editorial board, but its expenditures shall be subject to the control of the financial committee of the general society, and, further, the general management shall be controlled by a council consisting of the president, the presidents of the sections and the usual associates.

When such an organization is accomplished by us, it will doubtless be with the extension to the sections of the right to hold meetings when and where they please, limited only by the condition that one meeting in each year shall be in association with the whole body of affiliated societies. A preliminary step in this direction, which seems to work well, has been the adoption at our meetings of the practise of holding sectional meetings in addition to the general concourses participated in by the society as a whole. A prominent feature of these general gatherings might be the presence by invitation of one or more distinguished foreign guests. This

feature would, I think, contribute not a little to the success of the meetings in more ways than one. It might, for instance, attract the attention of more of our countrymen at large to the importance and dignity of the science, and arouse for it and its aims a degree of interest and respect that sadly needs stimulation.

It is not to be understood that in the proposed differentiation of the society along these lines, our present local sections would be dispensed with. They fill, and doubtless will continue to fill, a most important field of usefulness.

Inseparably connected with this differentiation into sections is that of the eventual gradual development of the journal of the society, a project which should become no less a part of the general policy of the society than that of the formation of sections. As the society grows and chemistry develops, a single journal will become more and more cumbersome and unwieldy, and division must result. A short step toward this end has already been taken in the arrangement of the papers we now publish, all those relating to the major subjects being grouped together in each number of the journal; but this limited separation will soon fail to meet our needs and separate journals devoted to special subjects will be a further step in evolution. It is far better that these should be published by one powerful central organization than that they should be independent, for by reason of the greater economy resulting from centralized management more can be accomplished and offered than by the independent efforts of unaffiliated societies. One correspondent writes, "I believe that natural evolution of the American Chemical Society will be along these lines, namely, the organization of special societies with special journals, as affiliated bodies of the American Chemical Society receiving the common journal. The spe-

cific articles and abstracts relating to each individual branch will be found in a special journal." It is, of course, implied that so long as the members in a special field are too few to warrant the publication of a special journal, the papers relating to those fields would continue to appear in the common journal, which would otherwise be devoted to the proceedings, reviews and papers of general interest. It may, however, be seriously questioned if the separation of abstracts in the manner indicated would be advisable. It were, in my opinion, far better that these should continue to appear in a special abstract journal which should, like the common journal, go to all members. Those desiring could then subscribe, for a moderate sum, to such of the special journals other than that of their special field as they would feel able to afford.

Less closely related to the future of the society as a society is a matter—already laid before the council at Ithaca, but tabled without action—that must, however, sooner or later engage attention. This has to do with the question of compensation paid for chemical services and the reflection that is cast on the profession at large by the utterly inadequate recompense that is commonly offered and, of necessity, accepted. This is far below what the properly educated chemist should receive, considering the time and money spent in acquiring his education and the extent and variety of the knowledge that he must master at the start and accumulate so long as he practises his profession. In so far as this question has to do with regularly salaried employees, the solution is perhaps more troublesome than in the case of those performing special services, such as analytical work, and that phase of it I shall not consider. A serious obstacle to be overcome before analytical chemists can occupy the position in public estimation that should

be theirs, is that presented by shysters, posing as qualified chemists, particularly as analytical chemists, who seek and accept work at rates so low as absolutely to preclude accuracy in the results they obtain, so that the whole profession suffers for their misdoing. That these men are able to attract customers may be due to the greed of both employed and employer, but is in larger measure due to the ignorance of the employers as to the real nature of chemical work. It will be difficult, if not impossible, to educate the public in chemistry, but it would seem as if a partial solution might be reached by establishing some such standard of efficiency as that represented by membership in the Society of Public Analysts in Great Britain, which should be a guaranty, so far as such things can be guaranteed, that the member is a duly qualified analyst. Such an organization might well be established here, and it need in no sense compete with any other existing organization, nor need it call for more than nominal dues. Its membership should be most carefully guarded and any member showing himself unworthy should be summarily dropped. Such action would be *prima facie* cause for similar action by the American Chemical Society with respect to the culprit, if he possessed membership in that society. Membership in that organization would then be a reasonable guaranty to those wishing work done that it would be well done, and the rates of compensation could be maintained at figures commensurate with the quality of the work. Those patronizing non-members would then have but themselves to thank if disappointment and loss resulted from so doing, and they would soon learn, as so many others have learned, that cheap work is usually bad work.

In the foregoing, I have endeavored to outline the present situation with its existing complications and some of the sug-

gested remedies, in so far as concerns the future of our society considered by itself. It may be permitted me, however, to look still further into the future, and to see therein the possibility of a yet wider affiliation than that already discussed, that of the several grand divisions of natural science, on a basis somewhat different from that now obtaining in the American Association for the Advancement of Science, an affiliation in which the American Chemical Society, by reason of its numbers and the importance of its field, shall occupy a most prominent position. Whether or not this vision is ever to come true, we should all work in harmony to the end of the formation of a grand organization of chemists that shall be a power for the greatest good to the profession and to mankind.

W. F. HILLEBRAND

U. S. GEOLOGICAL SURVEY

THE THIRTEENTH ANNUAL MEETING OF
THE AMERICAN MATHEMATICAL
SOCIETY

THE thirteenth annual meeting of the society was held in New York City on Friday and Saturday, December 28-29, 1906, forming a part of the general gathering of scientists in attendance at the meetings of the American Association for the Advancement of Science and the numerous affiliated societies. With this environment went a noticeable increase in attendance, over eighty members being present at the four sessions. Friday morning was devoted to a joint session with Section A of the association and the Astronomical and Astrophysical Society, Professor Simon Newcomb presiding. A large audience listened to seven papers from the fields represented. The remaining three sessions were somewhat crowded with the regular program, to which were added several papers from Section A. The great productive capacity of the society is rapidly

making it a serious problem to provide adequate facilities for presentation and discussion of the output.

At the afternoon session on Friday Professors E. B. Van Vleck and Morley, and on Saturday President White, Vice-President P. F. Smith and Professor Morley occupied the chair. Owing to the recent illness of President Osgood, the presidential address was not delivered; it is hoped that it may be given at some future meeting.

The council announced the election of Mr. E. I. Shepard, of Harvard University, to membership in the society. Eight applications for membership were received. The organization was authorized of a new section of the society, to be known as the Southwestern Section. (A preliminary meeting of the proposed section was held at Columbia, Mo., on December 1.) It was decided to hold the next summer meeting at Cornell University. An amendment of the constitution was adopted by which the editorial committee of the *Transactions* is included in the council.

At the annual election the following officers and members of the council were chosen:

President—H. S. White.

Vice-presidents—Heinrich Maschke, P. F. Smith.

Secretary—F. N. Cole.

Treasurer—W. S. Dennett.

Committee on Publication—F. N. Cole, Alexander Ziwet, D. E. Smith.

Members of the Council to serve until December, 1909—G. A. Bliss, E. W. Brown, M. W. Haskell, A. G. Webster.

The treasurer's report shows a balance of \$5,195.80 on hand December 14, 1906, being a gain of about \$1,360 for the year, and including about \$2,800 life-membership fund. The sales of the society's publications, exclusive of the *Bulletin* sent free to members, amounted during the year to over \$1,500. The library has increased to over 2,500 volumes. The number of papers presented before the society in 1906 was

176. The total attendance of members at the ten meetings of the year was 350; 192 members attended at least one meeting. The total membership of the society is now 547, a gain of 43 during the year.

The publication of the New Haven colloquium lectures, delivered at the last summer meeting, has been generously undertaken by Yale University. The volume will probably appear next fall.

The following papers were read at the meeting:

S. E. SLOCUM: 'The rational basis of mathematical pedagogy.'

F. L. GRIFFIN: 'On the law of gravitation in binary systems.'

JAMES MCMAHON: 'A differential property of the lamellar vector field.'

J. I. HUTCHINSON: 'A method of constructing the fundamental region of a discontinuous group of linear transformations.'

JAMES PIERPONT: 'Multiple integrals.'

OSWALD VEBLEN: 'Collineations in a finite projective geometry.'

W. R. LONGLEY: 'Some particular solutions in the problem of n bodies.'

MAX MASON: 'The expansion of an arbitrary function in terms of normal functions.'

R. D. CARMICHAEL: 'On Euler's ϕ -function.'

ARTHUR RANUM: 'On the group of classes of congruent matrices.'

W. B. CARVER: 'Sets of quadric spreads connected with the configuration $\Gamma_{n,r}$.'

C. J. KEYSER: 'Circle range transversals of circle ranges in a plane: a problem of construction.'

C. J. KEYSER: 'Concerning the analytic treatment of geometric involution.'

A. B. COBLE: 'A generalization of the plane Hesse configuration.'

A. B. COBLE: 'Involutory Cremona transformations.'

W. E. STORY: 'Denumerants of double differentials.'

VIRGIL SNYDER: 'Birational transformations of curves of high genus.'

T. E. MCKINNEY: 'On the continued fractions representing properly and improperly equivalent real numbers in a system of continued fractions depending on a variable parameter.'

H. E. HAWKES: 'On elementary divisors.'

E. B. WILSON: 'Rotations in higher dimensions.'

EDWARD KASNER: 'Systems of extremals in the calculus of variations.'

EDWARD KASNER: 'The motion of a particle in a resisting medium.'

R. P. STEPHANS: 'Note on a system of curves of class n and order $2(n-1)$.'

D. E. GILLESPIE: 'On the construction of an integral of Lagrange's equation in the calculus of variations.'

F. R. SHARPE: 'The general circulation of the atmosphere.'

The following papers from the program of Section A of the American Association for the Advancement of Science were also laid before the society:

G. B. HALSTED: 'The sect carrier and the set sect.'

HARRIS HANCOCK: 'On a fundamental theorem of Weierstrass by means of which the theory of elliptic functions may be established.'

G. A. MILLER: 'On the minimum number of operations whose orders exceed two in any finite group.'

The informal dinner, always arranged in connection with each meeting of the society, adds much to the pleasure of these occasions. Despite the many distractions incident to the general gathering of scientists, over forty members attended the dinner on Friday evening and passed a few pleasant hours in social intercourse and renewal of old acquaintance.

The Chicago Section met on the same days as the society. The next meeting of the society, and also of the San Francisco Section, falls on Saturday, February 23.

F. N. COLE,
Secretary

THE AMERICAN PHYSIOLOGICAL SOCIETY

At the meeting of the society, held in New York City, December 27, 28 and 29, the following officers were elected:

President—William H. Howell, Johns Hopkins University.

Secretary—Lafayette B. Mendel, Sheffield Scientific School, Yale University.

Treasurer—Walter B. Cannon, Harvard Medical School.

Additional Members of the Council—Graham Lusk, University and Bellevue Hospital Medical College; John J. Abel, Johns Hopkins University.

The following were elected to membership:

Dr. Roswell Parker Angier, instructor in psychology, Yale University.

Dr. Philip A. Shaffer, instructor in pathological Chemistry, Cornell University Medical School.

Dr. Alexis Carrel, The Rockefeller Institute for Medical Research.

Dr. Eugene L. Opie, associate of the Rockefeller Institute for Medical Research.

Dr. Charles George Lewis Wolf, instructor in physiological chemistry, Cornell University Medical School.

Dr. Howard Davis Haskins, instructor in organic and physiological chemistry, Medical Department, Western Reserve University.

Dr. Donald R. Hooker, assistant in physiology, Johns Hopkins University.

Dr. John A. English Eyster, instructor in physiology, Johns Hopkins University.

Dr. John Raymond Murlin, assistant professor in physiology, University and Bellevue Hospital Medical College.

Dr. Ross Granville Harrison, associate professor of anatomy, Johns Hopkins University.

PROGRAM

Wednesday, December 26, 8:30 P.M.

Smoker, at the Murray Hill Hotel, Park Avenue and Forty-first Street.

Thursday, December 27, 10 A.M.

Physiological Laboratory, the University and Bellevue Hospital Medical College, Twenty-sixth Street and First Avenue.

General business. Reading of papers.

R. H. CHITTENDEN: 'The Minimal Proteid Requirement of Some High Proteid Animals.'

G. T. KEMP and L. D. HALL: 'The Formation of Fat in Animals Fattened for Slaughter.'

W. P. LOMBARD: 'The Rate of Loss of Weight of Normal Man.'

G. LUSK: 'The Influence of Mechanical Work in Phlorhizin Diabetes.'

J. R. MURLIN (by invitation): 'The Sparing Action of Gelatin.'

P. A. SHAFFER (by invitation): 'The Effect of Muscular Activity on Kreatinin Excretion; with Preliminary Observations on the Excretion of Kreatinin in Health and Disease.'

O. FOLIN: 'The Occurrence and Formation of Alkylamines and Alkylureas.'

W. SALANT: 'The Formation of Sugar from Amino-acids.'

G. B. WALLACE and J. S. DIAMOND: 'The Effects of Cocaine on the Liver.'

W. SALANT and G. M. MEYER: 'On the Elimination of Radium in Normal and Nephrectomized Animals.'

W. KOCH: 'The Relation of Inorganic Salts to Lecithin and Kephalin.'

C. L. ALSBERG, L. J. HENDERSON, H. B. WEBSTER and R. FITZ: 'Contributions to the Physiology of the Phosphates.'

C. L. ALSBERG and G. W. HALL: 'Concerning Glycolysis.'

A. S. LOEVENHART, G. PEIRCE and C. G. SOUDER: 'Some New Observations on the Action of Lipase.'

J. R. MANDEL and P. A. LEVENE: 'Nucleins of Codfish Roe.'

J. A. MANDEL and P. A. LEVENE: 'Glucothionic Acid in Pus.'

The secretary presented the question of proteid nomenclature for discussion.

The election of the council was held at 12 M.

Friday, December 28, 10 A.M.

Physiological laboratory, the College of Physicians and Surgeons, 437 West Fifty-ninth Street.

General business. Reading of papers.

C. F. HODGE and O. P. DELLINGER: 'Functions and Structures in *Amœba proteus*.'

J. DAWSON (by invitation): 'Physiological Reactions of *Physa*.'

R. S. LILLIE: 'Production of Artificial Parthenogenesis in *Asterias* Through Momentary Raising of Temperature.'

E. P. LYON and O. P. TERRY: 'Preliminary Report on the Enzymes of Unfertilized and Fertilized Eggs.'

G. N. STEWART: 'Experiments on Resuscitation.'

Y. HENDERSON: 'Artificial Regulation of the Heart-rate.'

J. ERLANGER and J. R. BLACKMAN: "On the So-called 'Ligature of Stannius in the Mammalian Heart.'"

A. J. CARLSON: 'On the Mechanism of the So-called Refractory Period of the Heart.'

A. J. CARLSON: 'On the Relation of the Normal Rhythm to the Sodium Chloride Rhythm of the Heart.'

W. T. PORTER: 'Vasomotor Reflexes.'

C. W. EDMUNDS: 'The Influence of the Digitalis Series up the Velocity of the Blood Stream.'

F. S. LEE: 'The Cause of the Treppe.'

F. S. LEE: 'Methods of Studying Fatigue.' (A demonstration.)

C. L. ALSBERG: 'Demonstration of the Adiabatic Calorimeter of Richards, Henderson and Frevert.'

The election of new members was held between twelve and one o'clock.

The afternoon session was devoted to informal demonstrations.

Saturday, December 29, 10 A.M.

Rockefeller Institute for Medical Research, Sixty-sixth Street and Avenue A.

Joint session with the Section (K) of Physiology and Experimental Medicine of the American Association for the Advancement of Science.

R. M. YERKES: 'The Functions of the Ear of the Dancing Mouse.'

S. J. MELTZER and J. AUER: 'The Effect of Section of one Vagus upon the Secondary Peristalsis of the Oesophagus.'

F. P. UNDERHILL and L. B. MENDEL: 'On the Alleged Adaptation of the Salivary Glands to Diet.'

C. H. NEILSON (by invitation): 'Adaptation of Saliva to Diet.'

W. KOCH and H. S. REED: 'The Effect of Phosphorus Starvation on *Aspergillus niger*.'

W. J. GIES: 'New Chemical Facts about Tendon and Compound Proteins.'

W. J. GIES and W. N. BERG: 'A Further Study of Peptolysis.'

L. LOEB (by invitation): 'The Action of Blood Serum and Tissue Extracts on the Coagulation of the Blood.'

W. B. CANNON: 'Some Observations on the Oesophagus after Bilateral Vagotomy.'

L. B. STOOKEY and M. MORRIS: 'Concerning the Pharmacological Action of Salicylic Acid.'

P. A. LEVENE and J. E. SWEET: 'Nuclein Metabolism Experiment on a Dog with Eck's fistula.'

P. A. LEVENE, W. A. BEATTY, D. R. MACLAURIN and C. H. RUIJLER: 'Protein Analysis.'

J. AUER: 'Demonstration of Normal Gastric Peristalsis in the Rabbit.'

J. AUER and S. J. MELTZER: 'Peristalsis of the Rabbit's Cæcum' (with demonstration).

A. CARREL (by invitation): 'Preservation of Blood Vessels in Cold Storage.'

S. J. MELTZER: 'Demonstration of the Failure of Regeneration of the Cervical Ganglion Twenty-six Months after its Removal.'

The members of the society were invited to luncheon on Thursday, Friday and Saturday, at one o'clock.

A scientific exhibition was held at the American Museum of Natural History during convocation week, under the auspices of the New York Academy of Sciences. The purpose of the exhibition is to collect and demonstrate objects showing the most recent advances in the different departments of science. The Committee on Physiological Exhibit consisted of William J. Gies, chairman; Joseph Erlanger, William H. Howell, Frederic S. Lee, Jacques Loeb, Warren P. Lombard, Graham Lusk, S. J. Meltzer, Lafayette B. Mendel, William T. Porter, Edward T. Reichert, G. N. Stewart.

The next meeting of the society will be held in conjunction with the Congress of American Physicians and Surgeons in Washington, May, 1907.

LAFAYETTE B. MENDEL,
Secretary

THE AMERICAN SOCIETY OF VERTEBRATE PALEONTOLOGISTS

THE fifth annual meeting of the American Society of Vertebrate Paleontologists was held in the American Museum of Natural History, New York City, on Wednesday and Thursday, December 26 and 27, 1906. The following members were present:

Mr. Barnum Brown, American Museum of Natural History, New York City, N. Y.

Dr. Bashford Dean, Columbia University, New York City, N. Y.

Dr. Marcus S. Farr, Princeton University, Princeton, N. J.

Mr. J. W. Gidley, U. S. National Museum, Washington, D. C.

Mr. Walter Granger, American Museum of Natural History, New York City, N. Y.

Mr. W. K. Gregory, American Museum of Natural History, New York City, N. Y.

Dr. O. P. Hay, American Museum of Natural History, New York City, N. Y.

Dr. L. Hussakof, American Museum of Natural History, New York City, N. Y.

Professor F. B. Loomis, Amherst College, Amherst, Mass.

Dr. R. S. Lull, Yale University, New Haven, Conn.

Dr. J. H. McGregor, Columbia University, New York City, N. Y.

Dr. W. D. Matthew, American Museum of Natural History, New York City, N. Y.

Professor H. F. Osborn, American Museum of Natural History, New York City, N. Y.

Professor W. B. Scott, Princeton University, Princeton, N. J.

Dr. W. J. Sinclair, Princeton University, Princeton, N. J.

The following papers were presented at the meeting:

TITLES OF PAPERS READ AT THE MEETING

Dr. J. H. MCGREGOR: 'Mesosaurus and Stereosternum from the Permian of Brazil.' Illustrated by drawings, photographs and specimens.

Professor H. F. OSBORN: 'Faunal Succession in the American Tertiaries.' Charts and lantern.

Professor H. F. OSBORN: 'Brief Notices of Tyrannosaurus, Naosaurus, Elephas columbi, Allosaurus, and other Vertebrates Recently Mounted at the American Museum of Natural History.'

Dr. W. D. MATTHEW: 'A Lower Miocene Fauna from South Dakota.'

Professor F. B. LOOMIS: 'Conditions under which the Wasatch and Wind River Beds were Deposited.'

Dr. L. HUSSAKOF: 'The Devonian Fish-bearing Formations of Ohio and Eastern Canada.' Lantern illustrations.

Dr. BASHFORD DEAN: 'Notes on Fossil Sharks.' Illustrated by models.

Dr. W. K. GREGORY: 'Brief Notes and Observations on the Theory of Trituberculy.'

Dr. W. K. GREGORY: 'Exhibition of a Specimen of *Prorosmarus alleni*, a Primitive Walrus from the Miocene.'

Professor W. B. SCOTT: 'The Litopterna.' (The President's address).

Dr. CHAS. S. MEAD: 'The Gait and Correct Pose of *Brontosaurus*.' Illustrated by model of skeleton.

Mr. A. O. PETERSON: 'A Section of the Lower Miocene of Nebraska, and a List of its Vertebrate Fauna.'

Mr. EARL DOUGLAS: 'A Restoration of *Palæomeryx*.'

The following officers were elected for the ensuing year:

President—Professor Bashford Dean, Columbia University, New York City, N. Y.

Secretary-Treasurer—Professor Frederick B. Loomis, Amherst College, Amherst, Mass.

Executive Committee—Professor E. H. Barbour, University of Nebraska, Lincoln, Nebraska; Mr. Lawrence M. Lambe, Geological Survey of Canada, Ottawa, Canada; Professor J. C. Merriam, University of California, Berkeley, California; Dr. W. J. Sinclair, Princeton University, Princeton, N. J.

MARCUS S. FARR,
Secretary-Treasurer

PRINCETON, N. J.,
December 31, 1906

SCIENTIFIC BOOKS

THE BULLETIN OF THE AMERICAN MUSEUM OF NATURAL HISTORY.

IN the issue of May 25, 1900, of this journal a review was given of the *Bulletin of the American Museum of Natural History*. It was intended to be of some assistance to those unacquainted with the extent of these scientific contributions. It was suggestive simply, and embraced no intention of giving details or exhaustive titles. It concluded with volume XII. Since then nine volumes have been published, and a new series of subjects

BULLETIN SERIES: ANALYSIS OF CONTENTS. (PAPERS PUBLISHED.)

	13.	14.	15.	16.	17.	18.	19.	20.	21.
			Part 1.		Parts 1, 2, 3, 4.	Parts 1, 2, 3.			
Ethnology	1	1	1	1	3	3			
Archæology	3	1						2	2
Mammalogy	9	9		14			8	11	
Ornithology	2	2		1				2	4
Ichthyology									
Herpetology									
Entomology		2		3			6	9	9
Invert. Zoology ...		3		1			1		
Conchology		1							
Paleontology (Vert.)	4	3		8			12	11	7
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Geology		1		2			1		
Mineralogy	1								
Catalogue								1	
Pages ..	330	422	370	514	380	278	713	539	426
Plates	19	46	4	59	58	56	59	14	17
Figures and Cuts..	74	63	172	126	67	102	137	130	82

have appeared on its pages. A very eclectic notice is again offered, in which particularization will be even more limited than was the case in 1900. A tabulation of general classes of subjects, number of papers published under each, and the number of pages, figures and cuts, in each volume, is here subjoined. It can be expected that, in the wide circulation of SCIENCE, many readers will welcome this generalized description of the *Bulletins of the American Museum*.

A comparison between this table and the table of analysis of contents of this publication, for the first twelve volumes, shows an increase in the papers on entomology and vertebrate paleontology, continued activity in mammalogy, a decrease in ornithology, and generally elsewhere, conditions similar to those preexisting.

The bulletins show a tendency to increase in size, and the appearance of new workers as Drs. Matthew, Gidley and Hay and Professor Wheeler, with others (Nelson, Duerden, Loomis, Hussakof, Brown Van Duzee, Banks, Miller, Brues, Bandelier) diversify the pages with new authors, and animate them with new treatments. Papers of very considerable length are noticeable, as Part I. of Vol. XV., in Professor Boas's 'The Eskimo of Baffin Land and Hudson Bay,' the extended essays by Kroeber on topics furnished by the Arapaho Indians, studies supported by Mrs. Morris K. Jesup; and Dixon's contributions to the ethnology of California in the Huntington Expedition.

The first article in Vol. XIII., by Dr. Allen, discussed the mountain caribou of British Columbia with especial reference to Mr. Ernest Seton-Thompson's new species (*R. montanus*) and forms another contribution to the often noted variability of the genus, and contained the statement 'doubtless when series of specimens of caribou from different parts of Alaska, including the tundra district west of the Mackenzie Delta, and from different parts of the Northwest Territory, are brought together, it will be found that the caribous of the region north of the United States are differentiated into quite a number of well-marked local forms, as yet unde-

scribed.' Professor Whitfield describes some interesting fossils (*Receptaculites*, *Halysites*, *Heliolites*) from the arctic, brought back by Lieut. Peary. Mr. Stone contributes a narration, in part, of his adventuresome journey along the coast of northern Alaska. A shell gorget of Tarascan origin and certainly important, and an onyx jar from Mexico are described by M. H. Saville, and the same investigator adds an important and readable article on 'Cruciform Structures near Mitla.' Professor Osborn furnishes a discussion of the Phylogeny of the Rhinoceroses of Europe which illustrates "*the early separation, absolute distinctness, and great age of numerous phyla leading up to modern types.*" In importance this article easily exceeds the associated papers of this volume. The volume contains also a very illuminative analysis of variation in the meadow-lark by F. M. Chapman.

In volume XIV. two new contributors appear, W. D. Matthew and J. W. Gidley, both of whose names have since become very strongly impressed upon American vertebrate paleontology. Matthew's 'Additional Observations on the Creodonta,' and J. W. Gidley's 'Tooth Characters and Revision of the Genus *Equus*,' in point of originality and permanent results are the most valuable papers in the volume. Dr. Allen prepared a review of the question of the relationship of the musk-oxen of Arctic America and Greenland which also contained an extended historical reference. The same distinguished systematist included in this volume a study on the North American opossums. Dinosaur Contribution No. 6, by Osborn and Granger, appears in this volume, and Beutenmüller continued his painstaking papers on the lepidoptera. A useful descriptive catalogue of the Binney and Bland collection of mollusks closed the volume with six maps of *distributional intensity*, which were something of a novelty.

About this time an attempt was made to segregate articles on one class of subjects in single volumes, and volumes XV., XVII., XVIII. were in this way devoted to ethnology. These volumes are not yet completed and contain laborious papers by Boas, Dixon,

Kroeber and Wissler, papers for the most part concerning the aspects, features and results of the Mrs. Morris K. Jesup and Huntington Expeditions.

In volume XVI. perhaps preeminence of interest attaches to Aleš Hrdlička's paper on 'The Crania of Trenton, New Jersey, and their Bearing upon the Antiquity of Man in that Region,' which concluded with these pregnant words: "It may be added that all the crania described in this paper differ widely from those of the Eskimo (nor can I recollect a single important somatological fact, from my investigations or those of others, which would support the theory of a prehistoric occupation of *any* of the eastern states below the St. Lawrence river by the Eskimo)." New species, as usual, are described in this volume, both of fossil and living animals. An almost entertaining article by Professor Whitfield accomplishes the desirable result of proving that three fossil genera of cephalopoda are different stages of one, a fact distinguishable in the beautiful examples of *Heteroceras* in his cabinet of Cretaceous fossils. The important papers on phylogeny, by Professor Osborn, were continued, and an admirably illustrated paper by Dr. E. O. Hovey on the eruptions in Martinique and St. Vincent seems a welcome variation from the endless process of creating and destroying species. Professor Whitfield's description of a genus of fossil alga in the Niagara shale has interest, as well as that of the new teredo-like shell from the Laramie. Mr. Beutenmüller added one of his instructive studies on larvæ of *Catocala*, and his minute discriminations in the 'Earlier Stages of some Moths.' Dr. Duerden's paper on 'Algæ as agents in the Disintegration of Corals' is in this volume.

Volume XIX. is the thickest, the most voluminous of all the volumes, though it does not contain more articles nor does it exceed in interest its precursors. The new contributors were making themselves felt and the topics were, in some instances, to a degree, synoptical and comprehensive. Dr. Hay opens the nineteenth volume with a technical and strong paper on 'North American Cretaceous

Fishes,' in which the author displays his surprising anatomical skill. It involved very large corrections of previous observers. 'The Mammals of Northeast Siberia,' by Dr. Allen, was important. It emphasized the fact of the intimate relationship of the mammalian fauna of Siberia with that of Alaska. The itinerary of Mr. U. G. Buxton accompanying this paper is extremely interesting, and his notes appended to Dr. Allen's descriptions make good reading, and are most instructive. Dr. Allen concludes:

There is thus evidence that eastern Siberia has derived some of its present mammalian life from boreal America, and doubtless within a comparatively recent period. The American origin of various early types that eventually attained circumpolar distribution, as the horse, camel, rhinoceros, phyla, etc., is now well established by paleontological evidence, but that the same is true of some forms of the existing mammalian fauna does not appear to have been heretofore recognized.

Dr. Matthew discusses the minute fauna of the Titanotherium beds of Montana. A paper by Dr. Hrdlička on the parietal bone in Men and Mammals was somewhat responsible for the bulkiness of volume XIX. It was a rather over-extended discussion, but very learned, of an osteological feature, which apparently refuses to yield to this persistent study very definite conclusions.

Professor W. K. Gregory contributed a suggestive paper on the 'Shortening of the Elephant's Skull,' concluding:

The skull as a whole is thus highly adapted to resist the severe strains put upon it. The occiput, both in ontogeny and phylogeny, flattens out and rotates backward, spreading both vertically and laterally, until at last it forms, as it were, a great functionally solid bed-plate, receiving the thrusts of the opposite inverted arches into which the skull has been resolved.

Dr. Hay added another extended paper, on 'Cretaceous Fishes from Mt. Lebanon,' in which there were new species and new facts. Professor Osborn describes a new dinosaur, Mr. Gidley a new three-toed horse, and remarks that 'it seems probable that the genus *Hipparion* is limited in distribution entirely to the old world, and that the American

species formerly referred to this genus should be placed in a group distinct from *Hipparion*.'

A valuable paper of Professor Whitfield's on 'Six New Species of Unios from the Laramie Group,' attracts attention in this volume, pointing as it does to a possible western metropolis and origination for fresh-water shells of this family in the central and Mississippi basins.

A new glyptodon from the lower Pleistocene of Texas was described by Professor Osborn, and possesses extreme interest. "It proves to represent a new genus and species, combining characters of several of the South American forms of the Pleistocene and Miocene periods."

The Stone Expedition to Alaska in 1902 collected 1,100 specimens of mammals, representing 43 species and subspecies, in which are 50 head of large game, and a series of 31 skulls of the Kadiak bear. It was a remarkable collection. Dr. Allen describes it, and among its additions to existing species is to be noted the Osborn caribou (*R. osborni* Allen). Mr. Barnum Brown describes a new genus of ground sloth from the Pleistocene of Nebraska, Mr. Beutenmüller new insects, and Professor Wheeler distinctly furnishes a new literary and scientific interest in his careful studies and speculations upon ants, amongst which prominence should be given to his views upon gynandromorphism in these insects.

Vol. XX. of the *Bulletin* was characterized by the signal predominance of the papers in 'Mammalogy, Vertebrate Paleontology and Entomology.' It is impossible or unnecessary to particularize. The articles were systematic and descriptive; all possess the distinctive authority of their writers in their several fields of research, but two, of especial interest, claim individual notice. The first is by Dr. Matthew, on 'Two New Oligocene Camels,' from which this conclusion may be quoted:

In the Miocene the camels show increasing divergence and variety of type, and their relationship to the preceding and succeeding stages is far from clear. While we have reason to believe that the center of dispersion of the Camelidae was somewhere on the North American continent, we have no reason to believe that it was in the partic-

ular regions from which our fossil species have been obtained.

The second is by Professor Osborn on the great Cretaceous fish, *Portheus molassus* Cape. It is preliminary and brief, but it announced the possession by the museum of a most remarkable and monstrous fossil fish procured by Mr. Charles H. Sternberg in 1900 from near Elkada, Logan Co., Kansas. Professor Wheeler included in this volume a very readable and attractive paper on 'Social Parasitism among Ants.'

In volume XXI. two very important papers from Dr. Hay are noticed in which that well-known osteologist locks horns with European authors, and discusses the origin and relationships of the testudines. A paper admirable in diction and beautifully illustrated is Chapman's 'Life History of the American Flamingo.' Professor Wheeler contributes a discussion paper on 'An Interpretation of the Slave-making Instincts in Ants,' which is somewhat varied in type from the ordinal group of papers, and is very suggestive. The remainder of the volume contains the valuable and learned studies of the naturalists, whose papers have now for over twenty-six years maintained the high standard of this publication.

L. P. GRATACAP.

AMERICAN MUSEUM OF NATURAL HISTORY.

The Relation of Leaf Structure to Physical Factors. By EDITH S. CLEMENTS. *Transactions of the American Microscopical Society*, 1905, pp. 19 to 102. Published under a grant from the Spencer-Tolles fund.

In studying the reaction of the plant to its physical environment the leaf is a peculiarly favorable subject, because of its ready response to alterations in the environmental factors and because of the clearness with which such response is manifested in changes of structure. A considerable literature on the relations of leaf structure to environment has grown up in Europe, based upon the vegetation of northern Africa, tropical Asia, etc., as well as of Europe. But the subject has received comparatively little attention from North American botanists, notwithstanding the fact that our wide range of climate and conse-

quent diversity of vegetation-types offer exceptional opportunities for this line of research.

Mrs. Clements's paper, which constitutes another of the valuable contributions to ecological botany that have issued from the School of Botany of the University of Nebraska, should, therefore, receive a cordial welcome, the more so as it embodies the results of a well-considered and carefully executed plan of investigation. One is impressed at first glance with the great amount of painstaking work that has been necessary to carry out this plan. Not only have the details of leaf anatomy been studied in about 300 species of plants, most of which were represented by at least two different habitat-forms, but a large number of measurements were necessary to obtain the normals of the more important physical factors for each of a score of habitats. The methods followed are those outlined in Dr. F. E. Clements's 'Research Methods in Ecology.' The investigations were carried on during the summers of 1903 and 1904 in the mountains and foothills around Pikes Peak, Colo., with headquarters at the alpine laboratory of the University of Nebraska at Minnehaha. The paper begins with a survey of the most important literature. In a table on page 29 are presented the normals of light, atmospheric humidity, temperature (of the air, the surface of the ground and the soil) and water content of the soil for each of the habitats studied. The greater part of the paper is devoted to brief descriptions of the leaf anatomy of the species examined, both as to the normal structure and as to the variations caused by change of habitat. Quantitative variations were given much attention and were carefully measured. 'Endemic' species (those occupying only one habitat) are grouped according to habitat under the three types of hydrophytic, mesophytic and xerophytic plants. 'Polydemic' species (those occurring in more than one habitat) are also grouped as hydrophytes, mesophytes and xerophytes, according to the normal habitat of the species, but their classification according to habitat is not carried further. Instead, under each species name is

given a synopsis of the chief physical factors of the normal habitat, with brief descriptions of the corresponding leaf structure, followed by indications of the points of difference in the physical factors and leaf structure in the other habitats of the species.

A series of tables of species follow in which are graphically expressed the variations from the normal leaf structure that accompany departures from the normal environment, the varying factors of the latter being stated at the head of the table thus: 'light unchanged, water and humidity decreased.'

In the summary are stated the most important of the author's conclusions as to the effect upon the anatomical structure of leaves of each of the physical factors studied, attention being called to the points of agreement or of discord with the results of Heinricher, Dufour, Stahl and other well-known investigators. In future researches the writer believes that the phases of the subject which should receive especial attention are: "(1) the hereditary structure, which should include considerations of size, shape and position of leaf, as well as histology and modifications, such as hairs, stomata, mucilage cells and the like; (2) exact records of the physical factors of the habitat of the species for the day and for the growing season; (3) the physiological processes of the leaf; (4) the interrelation and correlation of the preceding data."

The paper is illustrated by nine excellent plates, showing the habitat variations of many of the species described.

To say that Mrs. Clements has published one of the most important papers dealing with this phase of American ecological botany is to render no more than justice to her achievement. An especially commendable feature of her work is the great volume of careful observations that serve as a basis for what generalizations are made. So high a ratio of fact to theory does not always characterize this branch of botanical literature. A good service has been rendered to American students of plant ecology by pointing out a field for future research which can not fail to be fruitful of results.

THOMAS H. KEARNEY

Beet-Sugar Manufacture. By H. CLAASSEN, Ph.D. Authorized translation from the second German edition by WILLIAM T. HALL, S.B., and GEORGE WILLIAM ROLFE, A.M. New York, John Wiley and Sons. 1906. Pp. xiv + 280.

Claassen's '*Die Zuckerfabrikation*' was first published in 1901. Its sterling merits soon won for it such general recognition that the second edition in German followed within a few years, and now we have an authorized English translation of the work.

The scope and plan of the book embraces the entire process of beet-sugar manufacture from the time of the receiving of the beets to the finished product.

Individual chapters are devoted to the delivery of beets, their transportation and washing, weighing and slicing, utilization and disposal of exhausted chips, the process of defecation and of carbonatation, evaporation, the boiling of sugar, the preparation of raw sugar and the preparation of sugar crystals, the treatment of after-products and the utilization of molasses.

In addition to these themes the book discusses the boiler-house, the questions of economy of fuel, high-pressure and low-pressure boilers, heat losses, the construction and operation of lime-kilns, the factory control and determination of sugar losses, the setting up and running of a beet-sugar factory and the utilization of waste products incidentally produced in the process.

This mere enumeration of the contents of the work well indicates that the author has intended to prepare a monograph of beet-sugar manufacture which should not lack a single essential detail—and Claassen has succeeded in doing all which he has set out to do.

His thorough practical knowledge of beet-sugar manufacture—for many years he has been the director of one of the leading beet-sugar houses of Germany—joined to an exceptional ability to express his thoughts in a clear and concise manner, has resulted in the production of a book which ranks with the very best in the sugar literature of the day.

Turning from the work of the author to that of the translators, it is a pleasure to state

that their work, too, is everything that could be desired.

In their preface they state that they have introduced into the English text data of factory practise in units which are employed in American houses. In many beet-sugar houses in this country the metric system is well understood and the centigrade thermometer is used; it is to be hoped that the introduction by the translators of the American equivalent weights and measures will tend to a greater familiarity with, and ultimately to the sole use of, the metric system in this important and growing industry.

Several of the tables appearing in the German edition have been omitted in the English text; also Appendix II., which treats of the construction of an evaporating-plant and the steam consumption for working 100 kg. beets per minute, and Appendix III., which deals with sugar statistics. These omissions seem well warranted, as the matter thus left out is presumably of very little importance to the general reader.

A few typographical errors and slips have crept in, but these will unquestionably be noted and corrected in a future edition, which, no doubt, will soon be warranted.

The American sugar industry is certainly to be congratulated on having so valuable and practical a book placed at its disposal.

F. G. WIECHMANN

SCIENTIFIC JOURNALS AND ARTICLES

THE *American Naturalist* for December contains the second, and concluding instalment of 'The Causes of Extinction of Mammalia,' by Henry F. Osborn. This discusses such matters as infectious diseases and insects, competing and hostile mammalia, internal causes of extinction, and the inadaptation of extreme size or specialization, with many references to literature on the subject and citation of examples. And yet, in summing up, Professor Osborn says: "The chief induction which can be made from this extensive survey of the causes of extinction seems to be this: following the diminution in number which may arise from a chief or original cause, various other causes conspire or are

cumulative in effect." This conservatism is particularly refreshing in view of the many positive utterances as to the natural extinction of animals, the truth being that we actually *know* very little about it. T. D. A. Cockerell discusses at length 'The Alpine Flora of Colorado,' giving many tables showing the northerly range and vertical distribution of various species: The third long paper, by Thomas J. Headlee deals with the 'Blood Gills of *Simulium Pictipes*.' The number contains the title page and index for the volume.

The Museum News of the Brooklyn institute for January notes 'An Interesting Case of Retardation of Pupæ of a Texas Moth,' *Agapema galbina*, a number of cocoons obtained in 1903 having yielded perfect insects for three consecutive years with the probability that one or two more may appear in 1907. It is stated that the museum has obtained by the bequest of Mr. Henry Mumford the fine series of shells secured by the late Isaiah Greegor comprising 2,400 species and 15,000 specimens. This collection by the terms of the will is henceforth to be known as the Phebe L. Mumford Collection. A brief description is given of the exhibit of the museum, under the auspices of the New York Academy of Sciences, to illustrate progress in zoology. The leading article in the section devoted to the Children's Museum is on the skunk. It is stated that while the general attendance at the Children's Museum is less than during 1905 the attendance of teachers is much greater.

SOCIETIES AND ACADEMIES

THE BIOLOGICAL SOCIETY OF WASHINGTON

THE 420th meeting was held on November 17, 1906, with President Knowlton in the chair and an audience of forty persons.

Professor A. S. Hitchcock remarked on the code of nomenclature recently adopted by the International Congress of Zoologists, comparing its provisions with similar codes adopted in this country. Mr. A. A. Doolittle exhibited an abnormal rose, lacking a pistil and with the stem continued into the flower.

Dr. E. L. Greene spoke 'On So-called *Rhus Toxicodendron*.' The purpose of the paper was twofold. First, that of demonstrating fundamental distinctions between *Rhus* and *Toxicodendron* as perfectly distinct genera, according to which view no such name as *Rhus Toxicodendron* should be used. Proper *Rhus* has always a many-pinnated foliage, and its inflorescence is always one only to each branch and that strictly terminal. *Toxicodendron* as universally exhibits but three leaflets to each leaf, and as many inflorescences, almost, as there are leaves on the branch, namely, one in each axil, none ever terminal. The individual fruits are again as widely different in the two genera. Moreover, *Rhus* in all its species is innocuous. *Toxicodendron* is acridly poisonous in all its forms. A historic sketch of *Toxicodendron* was given, beginning with its first publication as a three-leaved ivy, by Cornutus, at Paris in 1635; after that, separated from the Ivy, and proposed as a genus *Toxicodendron* by Tournefort in 1694; augmented by Dillenius in 1732; suppressed by Linnæus, who made the name *Rhus Toxicodendron* in 1753; restored to generic rank as *Toxicodendron vulgare* by Philip Miller in 1768. Secondly, a long series of *Toxicodendron* specimens was exhibited, from almost all parts of North America from the Atlantic to the Pacific, and from Maine to central Mexico; these portraying as much diversity of foliage, fruit and modes of growth as, were they oaks or maples, would be accepted for two dozen species. *Rhus Toxicodendron*, so-called, is really a genus *Toxicodendron* made up of probably twenty or more valid species. Some remarks followed, chiefly on that part of the paper in which the action of *Toxicodendron* poison and its reputed remedies were touched upon.

The second paper was by Dr. Barton W. Evermann on 'Fish Culture and Fish and Game Protection in the Cornell and Yale Forest Schools.' He explained the relation of fish culture and the protection of fish and game to forestry and to the practical work of the forester, and the consequent incorporation of instruction on these subjects as a regular part of technical forestry courses. His re-

marks were illustrated by a number of lantern slides taken during the field courses given by him at Axton, in the Adirondacks, for the Cornell School, and at Milford, Pa., for Yale University.

The third paper, 'A Record of the Black Rat in Virginia,' was read by Mr. William Palmer. He noted the occurrence of an isolated colony of the black rat (*Mus rattus*) on the top of a Virginia mountain, Peaks of Otter, in Bedford County, at an elevation of 3,875 feet. The specimens collected are not quite typical. Probably but few individuals now exist in and about an old store at the summit.

THE 421st meeting was held on December 1, 1906, President Knowlton in the chair and about fifty persons present.

General T. E. Wilcox remarked on the unusual abundance of quail and the cottontail rabbit in New York a few miles south of Utica.

Dr. Evermann informed the society of the recent death of two naval officers to whom biological science is much indebted, Lieutenant Franklin Swift, retired, of the steamer *Fish Hawk*, and Lieutenant-Commander Leroy M. Garrett, of the *Albatross*. Lieutenant Swift died on November 10, at Charleston, S. C., of typhoid fever, and Lieutenant-Commander Garrett was washed overboard 500 miles northwest of Honolulu on November 21, while the *Albatross* was returning with the great collections of the trip to Japan. These officers have commanded these research vessels during some of their most important work and are in large part responsible for the excellent results obtained.

Dr. L. O. Howard presented the first paper, on the subject 'Polyembryony and Fixation of Sex.' This paper was published at length in *SCIENCE*, December 21, 1906.

The second paper consisted of an illustrated lecture by Mr. John W. Titcomb, on 'Principles and Methods in Fish Culture.' He explained the underlying principles of artificial propagation as applied chiefly to salmonoid fishes, described in detail the methods and manipulations concerned and illustrated every

point by lantern-slide pictures, showing apparatus, operations and the fishes themselves in all stages from the egg upward. He commented on the relation of fish culture to various natural sciences. The long and interesting series of illustrations included pictures showing the inauguration of fish culture by the speaker in Argentina, South America.

M. C. MARSH,
Recording Secretary

DISCUSSION AND CORRESPONDENCE

POLYEMBRYONY AND SEX-DETERMINATION

IN an extended review in the last number of *SCIENCE* (December 21, 1906), Dr. Howard has emphasized the astonishing and valuable results of the recent work by Marchal ('98, '04) and Silvestri ('05, '06) on the spontaneous polyembryony of certain parasitic Hymenoptera. He has quoted Bugnion's discussion of the bearing of this work on sex-determination but has not called attention to the fact that in the light of Silvestri's work this view may need revision.

As stated, Bugnion, '91, in the course of his work upon *Encyrtus* had noted that as a rule all of the individuals emerging from one host belong to a single sex. At the time, Bugnion thought that this "should be attributed to an occasional parthenogenesis, the caterpillars giving birth exclusively to males having been those which had been pierced by a non-fertilized *Encyrtus*."

This conclusion, which was a logical one in view of the data then at hand, Bugnion discards completely since the appearance of Marchal's work. He believes that the phenomenon must be "a natural consequence of polyembryony, and that one would expect the sexes to be separated in this way wherever the embryos come from the division of a single egg."

While the latter clause is undoubtedly true, the possibility of the facts being explained on the basis of parthenogenesis is by no means excluded. Bugnion, in his work, did not observe the oviposition. Marchal presents no evidence that parthenogenetic development does not take place. In fact, he purposely leaves the question open, as '04, p. 298, "Le

cause de cette détermination reside-t-elle dans la fécondation pour le sexe femelle, et dans l'absence de fécondation pour le sexe mâle, il se peut qu'il en soit ainsi, mais le fait n'est pas démontré."

On the other hand, Silvestri very definitely determined that in the case of *Litomastix* the parthenogenetic development does take place and that, as in the bees, the fertilized eggs always give rise to females, the unfertilized to males. Until further observations have been made it would seem unsafe to discard Bugnion's earlier hypothesis that the observed facts regarding the preponderance of one sex or the other in *Encyrtus* are to be likewise explained.

WM. A. RILEY

VARIATION OR MUTATION?

SYSTEMATIC zoologists are not likely to be hasty in endorsing the dogma of de Vries in respect of individual variations, or 'fluctuations' in his terminology: " * * * they may be proved to be inadequate even to make a single step along the great lines of evolution, in regard to progressive as well as retrogressive development."¹

There are two methods of approach to the part played by mutations and individual variations in the development of specific characters: the comparative, in use by taxonomists, and the experimental, at the hands chiefly of embryologists.

The argument for individual variation from the comparative side was well presented by Dr. C. Hart Merriam, in his vice-presidential address before the American Association, and that for mutations from the experimental side, with equal clearness, by Professor Davenport, in *SCIENCE* of November 2, although he does not take the extreme view of de Vries.

Now, both systematist and experimenter will admit the absence of any exact means of determining what may or may not have been originally a mutation in such cases, for instance, as slight discontinuity observed under nature where there is no knowledge of the race history—for when Davenport asks: "But will it not be often impossible to say whether a new-appearing quality is truly new or

old?"² no one can deny him. The statistical method, though it be fondly looked on as a universal solvent, can give no help here, for it points out only the end facts, not their causes, and there seems to be no resource but in the balanced judgment of competent observers. Therefore, when one so qualified as Dr. Merriam states his opinion that in more than a thousand species and subspecies of North American mammals and birds, he does not find one which appears to have arisen by mutation, he records a conclusion of great weight. Essential agreement with Merriam results from a similar examination of North American scaled reptiles.

The measure established is that a species or subspecies to be rated as a possible mutant must be separated from its nearest known congener by at least one indivisible character. This, I believe, accords with the standard set by de Vries, as well as with that of Professor Davenport. It might be claimed by extreme mutationists that monotypic genera, appearing to be related to a species of another genus occupying the same range, have arisen by mutation, but in these cases there is rarely valid evidence on either side, and as either view must be an assumption, they are not considered in this examination. If we are to reach a general rule of probability it must be through cases determined upon reasonable grounds.

I have followed Professor Cope's last descriptive list of Nearctic reptiles, not by any means from complete agreement with it, but for the reason that the analytic method favored by him left few variants unnamed.

Among lizards, Cope says of the genus *Sceloporus*: "I recommend it as an excellent *pièce de résistance* for those persons who do not believe in the doctrine of the derivation of species." This thought may be borrowed and extended to include the whole list of Nearctic lizards, and addressed to all who require evidence of the derivation of species by minute gradations, for nowhere else, perhaps, are they more general. There is no room here for mutations.

¹ 'Species and Varieties,' p. 18, 1905.

² *SCIENCE*, September 22, 1905, p. 370.

In serpents, such variations as the presence or absence of certain head plates, or of a pair of dorsal rows of scales, are fairly common in many genera, but as a rule they do not transgress the obvious limits of specific variation, and unless combined with other differences they are not regarded as deserving of a name. Nevertheless, when they do transgress they fall within our definition of a mutation, for these characters are the indivisible units of repetitive series, and between their presence or absence there can be no intergradation. Among the species and subspecies enumerated by Cope, there are thirteen such cases which might possibly be allowed as mutations. But even granting them to be such, they seem to have failed signally in giving rise to new species, for nine of them are known only from the one type specimen each, and of the tenth, two examples only were collected more than twenty years ago, at the same time, in a well-settled part of Texas. The remaining three cases, of more or less established forms, have some claim to consideration. They are these:

The genus *Storeria* consists of three species, two of which, *S. dekayi* with seventeen rows of dorsal scales, and *S. occipito-maculata* with fifteen, occupy practically the same range from Vera Cruz north over most of the Austroriparian and eastern regions. There are slight color differences, fairly constant, but the difference in scale rows seems to be entirely so, and all herpetologists admit their specific distinctness. As there can be no gradation between fifteen and seventeen scale rows, which vary always in pairs, one or the other of these species, probably *S. occipito-maculata*, seems to have arisen from the other by a process which might be called mutation. It may be allowed that the differential characters are not adaptive.

In exactly the same way *Virginia elegans*, occupying a limited western portion of the range of *V. valeriae*, differs from it in having two more scale rows.

Finally, *Eutænia elegans atrata* (= *E. infernalis vidua* Cope) appears to be an offshoot of *E. elegans*, presenting a quite distinct color pattern and a tendency to a reduction of scale rows. According to Van Denburgh they are

found only on the coast slope of the peninsula of San Francisco, and the examples I have seen were collected promiscuously with typical *E. elegans*. The mutation in this case would lie in the distribution of color, for the reduction in scale rows is not fully constant. Whether they breed true is not known, but their scarcity renders it doubtful.

But we are now close to a mere matter of names, for in two, at least, of these cases variation and mutation approach each other so nearly that they come under the same definition, for the addition or subtraction of a pair of scale rows represents the lowest possible term in a variation series, and the name given to it is largely a matter of choice; yet beyond these cases no other evidence for the origin of specific characters by mutation is yielded by the examination. The conclusion is near to that of Dr. Merriam.

The value of the experimental method is not questioned by the doubt whether theoretical interpretation of the behavior of 'unit characters' in the germ plasm has yet reached a stage of certainty sufficient to stand over against the body of evidence contributed by the comparative method, as to the minor rôle of mutations in specific development in vertebrates.

That mutants occur in feral animals is doubtless true, even much more widely than the cases of melanism and albinism cited by Professor Davenport, but it does not yet seem necessary to modify the opinion not long since expressed by me elsewhere—"In so far as its occurrence under nature is concerned, every zoologist who has worked over many genera for purposes of taxonomy will probably admit that many of his most perplexing anomalies, which occur now and then as one or a few individuals which can not be exactly placed, are in the nature of mutations, but few, I imagine, will be disposed to allow that they find evidence that these are inherited. . . . there is little evidence that they have been starting points of new species."

ARTHUR ERWIN BROWN

THE ZOOLOGICAL GARDENS,
PHILADELPHIA

"Theories of Evolution since Darwin," 1906.

NEW MEXICO GEOLOGY.

IN SCIENCE for June 15, Dr. C. R. Keyes, formerly president of the New Mexico School of Mines at Socorro, gives a general section of the formations of New Mexico. This is a sequel to a series of papers in other scientific journals, particularly the *Journal of Geology*, the *American Geologist* and the *American Journal of Science*, in which he has discussed various aspects of the geology of the territory. These articles treat of phases of the subject of great interest to geologists as bearing on the geology of a field as yet little known, but the author can not well be congratulated on the extent of the contribution he has made to our knowledge of the geology of this region. There are many inaccuracies and the papers are manifestly designed to anticipate the results of investigations rather than as a record of actual observations. Heretofore, Dr. Keyes has maintained there was no evidence that Lower Paleozoic formations were present in New Mexico. He places them in the column now published, however, with thicknesses and lithological characteristics but fails to advise us as to any circumstances concerning their discovery.¹ He gives the Devonian as made up of limestones, whereas, so far as known, they consist entirely of shales.² Limestones and shales are said to constitute the Carboniferous thus neglecting entirely the great body of sandstones contained in the upper division. The distribution of formations shown in the map (plate 7) Water Supply Paper No. 123, U. S. Geological Survey, is considerably at variance with the facts, as is likewise the discussion given there and elsewhere of the faults and unconformities. But discrepancies of this kind are doubtless inevitable in observations made from car windows and through a field glass. A large number of formation names are proposed, but we look in vain for detailed sections or descriptions showing their character and dis-

¹The announcement of the discovery of these formations in New Mexico was first made by L. C. Graton and the writer in SCIENCE for April 13, 1906, p. 590.

²*American Journal Science*, 4th Ser., Vol. 21, p. 394, 1906.

tribution. In this respect the author does not seem to be in accord with leading geologists generally, who maintain that no formation name should be proposed without adequate definition. The correlation of formations in regions widely separated, where detailed maps and careful paleontological studies are wanting, is usually regarded as a hazardous undertaking, but Dr. Keyes does not appear to find it so. If Dr. Keyes has at hand the data upon which these conclusions are based it is to be regretted he has not published them. We are told that this 'correlated scheme of rock succession' is based on information obtained through the work of the "Geological and Mineral Survey of New Mexico under the direction of the School of Mines at Socorro." Unfortunately we have no knowledge of such an organization aside from the mention made of it in this connection. Geologists generally would be interested to know something of an organization carrying on so important a work. It appears to be wholly unknown even in New Mexico.

These exceptions are possibly of no consequence and if his attention were called to them the author would doubtless reply, as in a former instance when the writer of this note reminded him that a fossil he had figured was wrongly named, that it was a 'matter of no importance.'

As a whole the papers on New Mexico geology which issue from the above named writer's pen in such rapid succession abound in inaccuracies, while the absence of detailed description or evidence of careful field work deprives them of any value they might otherwise possess.

C. H. GORDON

U. S. GEOLOGICAL SURVEY,
August 25, 1906

GEOLOGICAL WORK IN ARKANSAS BY PROFESSOR PURDUE

TO THE EDITOR OF SCIENCE: A paragraph in my letter to Doctor Branner, published in the issue of SCIENCE of December 7, is possibly open to misconstruction and may do injustice to Professor Purdue, of the University of Arkansas. The paragraph is as follows:

As to the invasion of fields occupied by professors of geology, there are in the files of the survey many letters to such professors urging them to work up the local geology and offering financial assistance and means of publication of their results. The case of the Fayetteville quadrangle is perhaps an apparent exception. It should be stated, however, that when the work was undertaken there Professor Purdue was practically unknown as a geologist and was, as a matter of fact, not sufficiently experienced to carry on independent work. Since his season with Adams he has been employed each summer and has submitted three folios for publication. It has been necessary, however, in connection with this work, to send more experienced men into the field with him, although he will receive the entire credit for the work.

It was not my intention to cast any reflection, even in a personal letter, upon Professor Purdue's work, the quality of which has been higher than that of most work done for the survey under similar conditions. When he was first entrusted with independent work, however, his field experience was less than is required for the regular members of the survey and his ability in this direction was not known to us. It is for this reason, and not because of any deficiency in the quality of his results that more experienced men have conferred or collaborated with him in the field. This course is, indeed, frequently necessary with regular members of the survey, as well as with per diem men. That Professor Purdue's work is regarded as good is sufficiently shown by the fact that an allotment for its continuance has been made every year since it was begun. A further point in his favor, and one highly appreciated, is that his results are submitted when promised.

CHAS. D. WALCOTT,
Director

SPECIAL ARTICLES

EVIDENCE OF MAN IN THE LOESS OF NEBRASKA

AFTER careful investigation the writer stands ready to announce his belief in the occurrence of human remains in the loess of this state, and for this primitive type he has proposed the name Nebraska loess man.¹

¹ Nebraska Geological Survey, Vol. II., parts 5 and 6.

Such importance attaches to the discovery as to warrant a paper devoted to the geological facts connected therewith.

Physiographic Features.—North of Omaha for a number of miles the topographic features are bold and abrupt for a prairie country due to the proximity of the Missouri River, the relief being 150 to 200 feet.

On all sides landslides are in evidence and must be reckoned with in all field work. Early in October Mr. Robert F. Gilder, of Omaha, opened a mound on Long's hill facing the Missouri River, ten miles north of Omaha or three miles north of Florence, Douglass County, Nebraska. From Florence north to Long's hill there is a continuous section along the roadside for about three miles and from the base of Long's hill to the summit, on which Gilder's mound is situated, there is an unbroken section, hence the geology of the place is well exposed, and being simple is easily interpreted. The public highway, which is about forty feet above the river level, is just upon the top of the Carboniferous, the dark carbonaceous shales of which constitute a distinct geological feature. Upon the shales there rests an average of ten to twenty feet of glacial drift containing occasional Sioux quartzite and granitic boulders. Upon the drift comes 150 feet of bright buff loess such as is conspicuous in and around Omaha and Council Bluffs.

Long's hill stands 200 feet above the river level, and 150 feet above the valley out of which it rises. It is a hill of erosion, and no discoverable land slip has complicated its simple geology. On its summit is Gilder's mound, in the superficial layer of which were found mound-builder remains, and in the deeper layer eight skulls and many bones of a still more primitive type. The writer at once joined Mr. Gilder in a critical investigation of the place, continuing the work from time to time to December 2, 1906, with results leading to the conclusion that two of the skulls are mound builders', in all probability. These were found in the upper layer readily discernible as a mixture of black soil and light buff subsoil such as would result from digging and burying. This layer has a

thickness of two and one half feet. Below it was an undisturbed layer of unmistakable loess, and in it numberless fragments of human bones and an occasional animal bone, loess shells and stray angular pebbles.

In brief, the conclusion is that in the case of the upper bone layer there was burial, in the lower, deposition. Those in the loess doubtless antedate the hill itself while those in the upper layer are subsequent to it. That archaic burial could have taken place in loess without detection is altogether improbable. Of necessity there would result a mixture of black with light soil and a breaking up of the lithologic structure. Where these bones occur the loess structure and color is perfectly preserved and it contains characteristic vertical lime-tubes, concretions and shells precisely as is customary. Out of the evidence at hand the writer concludes that bones of this layer were strictly synchronous with the loess formation in which they were found, in substantiation of which comes the fragmental nature of all of the bones, their water-worn condition, their range of distribution, and disassociation of parts.

One would scarcely think of such conditions being possible in the case of human burial; besides it is improbable that a primitive people would dig graves to a depth of twelve feet. Should a people without tools and appliances perform such an improbable feat, would they bury water-worn fragments, would they scatter them so widely as not to exceed five or six pieces to the cubic yard? How could they replace the earth in the grave in such order and regularity that there would be perfect structure and gradation of color from soil to subsoil?

Methods of Exploration.—Early in November the writer recognized that the bones in the loess were apparently fossil, and great care was exercised in all subsequent work. On extending the cross trenches which Mr. Gilder had dug, human bones scattered, water-worn, fragmentary and unrelated were found in natural undisturbed loess at all levels down to six feet. The most interesting single bit found on this occasion was the left half of a frontal bone secured at a depth of four to five

feet. Later at a distance of five feet the other half was dug up, and the two parts fit together, completing an interesting low-browed frontal. A jaw, which was found in undisturbed loess at a depth of four feet, was that of a youth. The crowns of the teeth were scarcely worn, so old age can not be assigned as the reason for the absence of all teeth save molars Nos. 2 and 3 in the right ramus and No. 2 in the left. Just as the teeth of any water-soaked jaw drop out readily, so it seems to have been with this one. The inference is that they were lost in the process of deposition. A week later work was resumed, the writer being accompanied by Mr. Robert F. Gilder and Dr. George E. Condra, and the attempt was made to be severely critical and careful.

All surface material was carefully removed and three wide shafts were sunk on the northern, eastern, and southern points of the mound. Each shovelful of earth was scrutinized, all bone fragments carefully saved and recorded. In all some twenty bits were found, as follows: a fragment from the base of a skull, fragments of ribs, limb bones, scapula and sacrum; a clavicle, calcaneum, three complete vertebræ, two metapodes and a phalanx.

Some of the bits mentioned were but slivers, other bits were two or three inches long. Some were badly etched by water, others gnawed by rodents. As each fragment was unearthed a block of the matrix was kept and as far as possible each fragment was preserved in position in the block.

There were but twenty fragments in this lot, for while it is true that the shafts were sunk to a depth of eight feet, and while bone chips were found at all levels, they were widely scattered and few in number. Among the fragments may be mentioned five or six bits of skull, as many bits of rib, the angle of a jaw, metatarsal No. 3, and two phalanges, and with them bits of *Anadonta*, *Succinea avara*, and several angular pebbles. When work was resumed a few days later a circle thirty feet in diameter was described concentrically about the mound, which is about eighteen feet in diameter. The northeast quadrant of the circle was divided into sectors

of twenty-two and a half degrees and lettered. This quadrant as a whole was excavated to an average depth of six feet its periphery to an average depth of eight to nine feet, and a shaft was sunk to a depth of twelve feet on the north edge.

The writer was accompanied and aided by Dr. George E. Condra, Edwin Davis, Paul Butler, and as time would permit by Mr. Gilder. Systematic work was continued for three consecutive days. Fragments of human bones, scattered and unrelated, were found throughout the quadrant at all levels even to the depth of eleven and one half feet.

It was plainly demonstrated that the part without the circle of the mound was quite as rich in bone fragments as that within. The relation of the two sets of bones may be viewed as purely accidental. In but a single instance were several bones found together. Three ribs, fragments of limb bones, and an astragalus were in proximity. Probably two hundred fragments were exhumed on this occasion. It should be noted that no whole bones were found excepting a few phalanges. Instead they are bone-chips and splinters, with an occasional section from a limb bone, and many of the fragments are pitted or etched. Out of this set the following fragments seem of especial interest: half of a jaw with a solitary molar, the condyle, angle, and region of the symphysis being weathered off, fragmentary rami of two other unrelated jaws, the bony palate with the two back molars in place. By far the most interesting and instructive specimen found at this time was a skull completely disarticulate, broken, and scattered over a space five by five feet.

This was taken out in blocks, and no attempt will be made to remove the bits from their original position, the intention being to keep everything in such condition as to facilitate the detection of inaccuracies and errors.

Age of the Supposed Loess Man.—The present paper concerns itself simply with the announcement of human remains found in undisturbed loess. The chief point is the evidence that human remains have been found in the loess, and whether this is the very oldest or newest loess seems a secondary considera-

tion. The loess here is not leached of lime salts, but is actively effervescent at all levels, arguing for recency of deposition. All recognize the chronological diversity in the loess formation, and whether Long's hill is in the main loess body, as we believe it to be, or in a much more recent one does not materially affect the relation of the bones to some stage of glaciation, the precise glacial or interglacial age being as yet undetermined.

The loess in question rests on Kansan drift, and though as young as the later Wisconsin sheet or younger, it is nevertheless old.

ERWIN HINCKLEY BARBOUR

THE UNIVERSITY OF NEBRASKA,

December 14, 1906

ASTRONOMICAL NOTES

THE UNITED STATES NAVAL OBSERVATORY

THE Naval Observatory is showing an activity in astronomical work and publication, which ought to go far toward creating a more favorable opinion of that institution than has sometimes prevailed in the past. Several volumes have recently appeared, containing observations of the sun, moon, planets and miscellaneous stars from 1900 to 1903, of the sun, moon, planets and comets from 1866 to 1891, and of standard stars and zodiacal stars from 1900 to 1902; also, reduction tables for transit circle observations and meteorological observations.

Several hundred pages and a large number of plates are also devoted to an elaborate study of the total solar eclipses of May 28, 1900, and May 17, 1901. The leading members of the astronomical department of the observatory are: Professors Skinner, Eichelberger and Littell and Assistant Astronomers Hill, Rice and Hammond, under the superintendency of Rear-Admiral Asa Walker, U.S.N. A large number of astronomers from other institutions assisted in the work of the eclipse expeditions.

THE SOLAR OBSERVATORY OF THE CARNEGIE INSTITUTION

THE solar observatory on Mount Wilson continues to surprise the astronomical public with its developments. A five- or six-foot mirror has perhaps appeared to most astronomers to mark the limit to practical construc-

tion, and to usefulness in most lines of astronomical work. Professor Hale, however, comes forward with the announcement that he is prepared, through the generosity of Mr. John D. Hooker, of Los Angeles, to undertake the construction of a reflecting telescope having an aperture of eight feet and four inches. Such an undertaking is of necessity somewhat in the nature of an experiment, but no one is better able to overcome the technical difficulties involved than Professor Ritchey, Mr. Hale's able assistant.

Meanwhile researches of importance are being pushed with the present equipment. Recent observations of sun-spots, taken in connection with spectroscopic studies carried on in the new laboratory, show that the differences between the spectra of the photosphere and of sun-spots are due to differences in temperature. It has also been shown that certain stars, as Arcturus, have typical sun-spot spectra, and are thus at a lower temperature than our sun.

POSITIONS OF STARS IN THE GREAT CLUSTER IN HERCULES. LUDENDORFF

THE positions of 833 stars in the great cluster in Hercules were determined photographically by Dr. Scheiner, of Potsdam, in 1892. After thirteen years, Dr. Ludendorff, of the same observatory, has independently determined the positions of 1,136 stars in the same cluster. Of course, the largest part of the stars measured by Scheiner were remeasured by Ludendorff. Both observers determined the brightness as well as the positions of the stars. The accordance between the results obtained by these two observers is in general extremely good. Ludendorff measured the stars on two plates, and from a comparison of the two determinations an idea can be formed of the precision which was attained. Grouped according to distance from the center in R.A., the differences range from $-0.15''$ to $-0.22''$. As might be expected, the mean differences increase systematically toward the center of the cluster, where the measurements are most difficult. Among 1,588 differences only 22, or 1 in 72, amount to more than $1''$. The probable error of a catalogue position in

R.A. is given as $0.179''$, and in declination $0.180''$. These values are somewhat smaller than the corresponding values in the work of Scheiner. Small systematic differences appear, however, between the two determinations by Ludendorff, and especially in the determinations of declination between Ludendorff and Scheiner.

The importance of precise measurements of the positions of the components of such clusters as that in Hercules can hardly be overestimated. Thirteen years may be too brief an interval for the determination of the proper motion of the cluster and the stars which undoubtedly are projected upon it, and much more so of the motions of the individual members of the group. When a suitable time shall have elapsed, however, these determinations should be of high value in the solution of the fascinating problems which are associated with the globular clusters.

Ludendorff finds only small changes in the brightness of the two variable stars discovered in this cluster by the writer, and no evidence of the variability of any other stars.

POSITIONS OF STARS IN THE CLUSTERS h AND x PERSEI. YOUNG

AN investigation similar to the preceding appears also as No. 24 of the 'Contributions from the Observatory of Columbia University.' This is an elaborate and valuable determination of the positions of 145 stars in the double cluster in the sword-handle of Perseus, by Anne Sewell Young. These clusters are little condensed, but are beautiful objects when seen with a low power. The plates employed were made by Rutherford during the years 1870-1874; they had double exposures of about six minutes. The measured stars were of the tenth magnitude and brighter. The methods of reduction have been in general those of Jacoby. The results appear to be of the highest precision and in good accord with the best work which has been done before.

RESEARCHES IN STELLAR PHOTOMETRY. PARK-HURST

A VALUABLE contribution to our knowledge of the variable stars has been made by Mr.

John A. Parkhurst, in a volume issued through the Carnegie Institution. This contains the results of observations by the author, during twelve years, of twelve variable stars of long period, and includes photometric determinations of the magnitudes of the comparison stars, measures of the light of the variables, and detailed and mean light-curves. Many of the recent measures were made with the forty-inch refractor, and are invaluable, since they furnish our only information in regard to the minima of some variables of large range.

Excellent photographic charts of the regions of the variables are given. It is unfortunate, however, that astronomers are not in agreement in regard to the scales of star charts. For terrestrial maps definite scales are generally employed. For astronomical charts a scale of one minute to the millimeter seems to be a natural one, with simple multiples and divisors of this scale, when necessary. This subject might be referred to a national or international committee.

S. I. BAILEY

HARVARD COLLEGE OBSERVATORY

CURRENT NOTES ON METEOROLOGY

CLIMATE AND CLIMATIC CHANGES IN KASHMIR

ELLSWORTH HUNTINGTON, whose work on Turkestan as a member of the Pumpelly Expedition of a few years ago is already well known, and who has more recently been engaged in further exploration of Central Asia, notably of Chinese Turkestan, contributes to the *Bulletin of the American Geographical Society* for November, 1906, an account of his studies in the Vale of Kashmir in 1905. The climate is described as warm and damp from June to August, though but little rain falls; mild and delightful in April, May, September and October; and cold and snowy in winter, when 'bracing' is not infrequently less true to the actual conditions than 'rigorous.' Of late years there has been an increasing influx of English summer visitors from India, who seek relief from the heat of India in the cooler and more favorable climate of the Vale of Kashmir. A study of the physiographic features of the region, especially of the river

terraces, as well as of the human history, leads to the conclusion that there has been a transition from colder or damper climatic conditions two thousand years or more ago to warmer or drier conditions to-day. This transition appears to Huntington to be part of a wide-spread climatic change extending at least from Persia and the Caspian Sea on the west to the borders of China proper three thousand miles away on the east.

MONTHLY WEATHER REVIEW

No. 9, Vol. XXXIV., of the *Monthly Weather Review*, contains the following articles of general interest: 'The Relation of the Weather to the Flow of Streams.' In this paper F. H. Brandenburg, District Forecaster at Denver, shows how many factors, meteorological and physical, control the run-off of streams. A 'Phenomenal Rainfall at Guinea, Va.,' on August 24 last, is reported by E. A. Evans, Section Director at Richmond, Va., to have yielded nine and a quarter inches in about thirty minutes. Professor Arthur Searle, of the Harvard Observatory, contributes a paper on 'The Zodiacal Light,' in commenting on which Professor Cleveland Abbe says editorially: "As this article by Professor Searle definitely settles the old question as to whether the zodiacal light and *Gegenschein* are atmospheric or celestial phenomena, we shall hereafter commend the publication of such material to the astronomical journals, and reserve the columns of the *Monthly Weather Review* for meteorology proper." 'The Direction of Local Winds as affected by Contiguous Areas of Land and Water,' by T. H. Davis. 'The West Indian Hurricanes of September, 1906,' by Professor E. B. Garriott. The development of hurricanes in this month was exceptionally active, a fact which the writer attributes, in part at least, to an unusually strong flow of air from the more northern latitudes toward the tropics. One of these storms, it will be remembered, caused serious damage at Pensacola and at Mobile.

A DISAPPEARING LAKE

ADDITIONAL evidence regarding the desiccation of Lake Chad, in central Africa, is

accumulating. Captain Tilho, of the recent Anglo-French Boundary Commission, points out that since the explorations of Barth and Nachtigal the form and area of Lake Chad have been profoundly changed. Navigation is only possible in certain places, and boats continually run aground. Instead of the great waves which, during strong winds, gave the lake the appearance of an ocean, there is now a tendency toward the development of a vast marsh (*Ciel et Terre*, November 16, 1906). It may be noted, in this connection, that there is nothing unreasonable in the supposition that Lake Chad is undergoing a temporary desiccation, which may again be followed, after some years, by another period of high water.

R. DEC. WARD

JOHN M. BROOKE

At his home on the outskirts of Lexington, Va., on December 14, within one week of his eightieth birthday, Colonel Brooke passed away.

John Mercer Brooke was born December 18, 1826, near Tampa, Florida. His father, General George M. Brooke, of Virginia, was a distinguished officer in the war of 1812, and his mother, Miss Thomas, was a native of Massachusetts. At the age of a little over fourteen years he became a midshipman in the navy, and three years were spent in cruising. In 1847 he was graduated from the Naval Academy at Annapolis, and soon afterward was assigned to work in the coast survey. From 1851 to 1853 he was stationed at the Naval Observatory in Washington, where began his life-long friendship with Matthew F. Maury, the distinguished hydrographer.

For several years prior to the civil war Lieutenant Brooke was engaged in making hydrographic surveys in the Pacific Ocean, particularly in the archipelago and along the coasts of China and Japan. It was in 1854 that Commodore M. C. Perry induced the Japanese to sign their first foreign treaty by which trade was opened with the United States, and good treatment was promised to shipwrecked crews. Brooke was thus allowed ready access to Japan, and while he was sojourning in Yeddo in 1859 his ship was de-

stroyed by a typhoon. He remained a number of months at Yokohama, during which he did much to develop the confidence of the Japanese in their foreign friends. They decided to send an embassy to the United States and invited Brooke to accompany it. So highly was he esteemed that he was invited by the Japanese ambassadors to help himself from a large chest of native gold, but this he declined. On the arrival of the embassy at Washington the first request of the ambassador was that the services rendered by Brooke to Japan should be recorded in the archives of the United States.

It was during his extended hydrographic work in the Pacific that Brooke thoroughly tested his deep-sea sounding apparatus, the invention for which probably he became best known. He had previously originated it at the Naval Observatory. With but few modifications his method has continued in use to the present time. It has been one of the most important elements in extending our knowledge of ocean depths and in rendering possible the first successful ocean cables.

Soon after Brooke's return to America the country became rent by civil war. Along with Maury he cast his lot with the seceding states, and the rest of his life was spent in Virginia. As a Confederate officer he gave his attention especially to naval ordnance. While Parrott was experimenting at West Point on the improvement of cast-iron cannon by reenforcement of the breech with a wrought-iron jacket, Brooke was absorbed in similar experiments at Richmond and Norfolk, and the Brooke guns were conceded to be the best made at the south. While Ericsson was developing his *Monitor* at Greenpoint Brooke and his associates were building the first Confederate ironclad, known as the *Merrimac*, which took part in the dramatic naval engagement at Hampton Roads. He remained at the head of the ordnance department of the Confederate navy until this navy ceased to exist.

After the close of the war Maury and Brooke became associated as professors in the Virginia Military Institute at Lexington, where Maury died in 1873. Brooke continued

to hold the chair of physics and astronomy until 1899, when the infirmities of old age necessitated his retirement with the rank of colonel. From that time until his recent death he lived in strict seclusion, retaining his connection with the institution as professor emeritus.

Personally Colonel Brooke was in his old age somewhat taciturn, retiring and singularly indifferent to popular recognition. The extraordinary influence which he exerted upon the Japanese shows that in his young manhood he was much more communicative, and that he was the possessor of great force, both of mind and of character. His ideals were lofty, and his fidelity to these and to his friends was unswerving. On coming to Lexington in 1866 he came into a congenial coterie that included such men as Robert E. Lee, Custis Lee, Pendleton, Letcher, Williamson and Maury, all of whom had held high office in the Confederacy. Among these intimates he was genial, full of humor and full of resources. Despite his modesty he was positive, a good hater, an intolerant foe to shiftiness and sham. In the performance of duty he was uncompromising to such an extent as to appear at times eccentric. These qualities became more pronounced with advancing years, and as death carried away one after another of his old friends he gradually became silent and exclusive. But to a willing ear he had a plenty to give, and the present writer remembers with pleasure his first interview with the solitary graybeard to whom he had just introduced himself. The old genial spirit came back as he became eloquent over his reminiscences of the Sea of Japan. During the last few years he has rarely ever been seen or heard, and the arrival of death was so gentle as to be scarcely recognized.

W. LeCONTE STEVENS

*PUBLICATIONS OF THE AMERICAN
ETHNOLOGICAL SOCIETY*

Announcement.—The American Ethnological Society is about to begin a series of publications which is to contain authentic material collected among native tribes of

America. The volumes are to appear at irregular intervals.

Notwithstanding the large amount of work that has been done on American ethnology, comparatively little material has been collected regarding the customs, beliefs, and ideas of the natives in their own words. Most of our collections have been obtained indirectly through the assistance of interpreters, or are discussions of information collected from individuals more or less familiar with English or with the trade jargon.

Knowledge possessed by the Indians is of great importance as well to the ethnologist as to the student of the early history of the American continent. For this reason authentic records of information given by the Indians seem to be of prime importance for a thorough study of these subjects.

The American Ethnological Society, in beginning its series of publications, is desirous of collecting and preserving for future use such records, and it is hoped that this undertaking will meet with the support of the public.

The following volumes of the publications of the American Ethnological Society are in preparation:

VOL. I. WILLIAM JONES, Ph.D., research assistant, Carnegie Institution, Fox Texts. In press. A collection of historical tales, myths, and accounts of personal religious experiences collected among the Fox Indians, a branch of the Algonquian stock. Recorded in original text, and published with translations.

VOL. II. EDWARD SAPIR, 'The Upper Chinook.' In press. An account of the Chinook Indians of the Upper Columbia River, and a collection of myths and personal accounts. Original texts and translations.

VOL. III. ROLAND B. DIXON, Ph.D., instructor in anthropology, Harvard University, 'Myths of the Maidu Indians of California.'

VOL. IV. FRANZ BOAS, Ph.D., professor of anthropology, Columbia University, 'Myths of the Tsimshian Indians of British Columbia.'

VOL. V. ROLAND B. DIXON, Ph.D., professor of anthropology, Harvard University,

'Myths of the Shasta Indians of Northern California.'

It is hoped that the following collection will also be published at an early date:

LIVINGSTON FARRAND, Ph.D., professor of anthropology, Columbia University, 'The Alsea Indians of Oregon.'

H. H. ST. CLAIR, 2D, 'Texts collected among the Coos Indians of Oregon.'

The price will be approximately \$2.00 for a volume of three hundred pages, and proportionately for larger or smaller volumes. It is hoped to bring out about two volumes a year.

JAMES GRANT WILSON, *President.*

FRANZ BOAS, *Vice-President.*

HARLAN I. SMITH,

Corresponding Secretary.

MARSHALL H. SAVILLE,

Recording Secretary.

GEORGE H. PEPPER, *Treasurer.*

SCIENTIFIC NOTES AND NEWS

DR. E. L. NICHOLS, professor of physics at Cornell University, president of the American Association for the Advancement of Science, was elected president of the American Physical Society at the New York meeting.

PROFESSOR GEORGE F. ATKINSON, of Cornell University, has been elected president of the Botanical Society of America.

OFFICERS of the Association of American Geographers were elected at the New York meeting as follows:

President—Professor Angelo Heilprin, Sheffield Scientific School.

First Vice-president—Professor Ralph S. Tarr, Cornell University.

Second Vice-president—Mr. G. W. Littlehales, U. S. Hydrographic Office, Washington, D. C.

Secretary and Treasurer—Professor A. P. Brigham, Colgate University.

Councillors—Professor W. M. Davis, Harvard University; Mr. Cyrus C. Adams, American Geographical Society; Professor J. Paul Goode, University of Chicago.

THE Brazilian government proposes to establish a national geological survey under the direction of Dr. O. A. Derby, who was for many years geologist of the state of S. Paulo. Dr. Derby went to Brazil in 1875 as a member

of the extinct Comissão Geologica, of which Professor C. F. Hartt was the chief. He has lived in Brazil ever since, and is the leading authority on Brazilian geology.

THE lords commissioners of the admiralty have appointed Sydney S. Hough, Esq., F.R.S., chief assistant to the astronomer at the observatory, Cape of Good Hope, to be astronomer at that observatory on the retirement of Sir David Gill, K.C.B.

PROFESSOR ARTHUR SCHUSTER has resigned his position as Langworthy professor of physics and director of the physical laboratories at Manchester. Dr. Schuster's connection with the university dates from 1871, when he entered Owens College as a student. In 1873 he held the post of demonstrator under Professor Balfour Stewart, and in 1881 he was appointed to the newly created chair of applied mathematics, which he resigned to become professor of physics in 1888. Both the council and the senate have placed on record by formal resolutions their regret at Professor Schuster's resignation.

PROFESSOR L. C. MIALI, D.Sc., F.R.S., will retire from the chair of botany in the University of Leeds in June, after thirty-one years' service.

DR. G. R. PARKIN has sailed from Liverpool to supervise the examinations for Rhodes scholarships throughout Canada and the United States. His address till the middle of February will be McGill University, Montreal.

MR. H. J. MACKINDER, M.A., director of the London School of Economics, has been appointed to represent the university at the Ninth International Congress of Geography to be held at Geneva in the summer of 1908.

SIR ALFRED JONES, president of the British Cotton-growing Association, has invited a party to accompany him to the West Indies in the interests of cotton-growing in the British colonies.

ON December 18 Dr. William Osler unveiled a portrait of the late Dr. J. E. Graham, formerly professor of medicine in Toronto University, a gift by the widow and son, Dr. J. S. Graham, to the Ontario Medical Library.

THE REV. ALEXANDER HARPER, M.A., Wishaw, has presented to the University of

Aberdeen with a fine collection of precious stones "in memorial recognition of the scientific eminence, personal worth, and perennial influence of James Nicol, professor of natural history, 1853-78."

THE deaths are announced of Dr. Karl Garzarolli, associate professor of chemistry at Vienna, and of Professor Lorenzo Tenchini, professor of anatomy at Palma.

THERE will be a civil service examination on February 5, to fill the position of chief food and drug inspection chemist in the Bureau of Chemistry of the Department of Agriculture at a salary of \$3,000, and of food and drug inspectors, at salaries of \$2,000. On the same day there will also be an examination for assistant in sugar-beet investigations at a salary of \$1,200 to \$1,400.

AN examination will be held in Chicago on January 22, under the direction of the Civil Service Commission, to select a psychopathologist for the Cook County Insane Hospital, Dunning. The salary is fixed at \$2,400, in addition to living expenses, and an excellent opportunity for original research is furnished.

THE honorary treasurer of the Imperial Cancer Research Fund has received from Mr. and Mrs. Bischoffsheim the munificent donation of £40,000 on the occasion of the celebration of their golden wedding.

THE International Association of Academies will hold its third general meeting at Vienna, beginning on May 29.

THE Astronomical and Astrophysical Society of America at the New York meeting during convocation week reelected its former officers and determined that its next meeting shall be held in the summer of 1908. The president is E. C. Pickering, of Cambridge, Mass.; the secretary is G. C. Comstock, of Madison, Wis.

THE American Forestry Association held its annual meeting at Washington beginning on January 9. The report of the board of directors was read by Dr. Thomas E. Wills, secretary, and addresses were made by Secretary Wilson, Mr. Gifford Pinchot, Professor H. S. Graves and others.

THE New York Association of Biology Teachers will hold its annual meeting at the High School of Commerce on the evening of January 25. Professor Gary N. Calkins, of Columbia University, will speak informally on 'The Life Cycle of Protozoa.'

THE preliminary program of the seventh meeting of the Congress of American Physicians and Surgeons on May 7, 8 and 9, has been issued. Sixteen national societies devoted to the medical sciences will meet in affiliation at the congress. The program of the congress itself is as follows: .

Tuesday, May 7, 3 P.M.—'The Historical Development and Relative Value of Laboratory and Clinical Methods in Diagnosis.'

DR. WILLIAM OSLER, of Oxford, England: 'The Evolution of the Idea of Experiment in the Study of Medicine.'

DR. LEWELLYS F. BARKER, of Baltimore, Md.: 'On Neurological and Psychiatric Diagnosis.'

DR. ALFRED STENGEL, of Philadelphia, Pa.: 'On Chemical and Biological Diagnosis.'

DR. RICHARD H. CABOT, of Boston, Mass.: 'On Physical Diagnosis.'

Followed by a discussion by Prof. Fred'k Müller, of Munich, Dr. George Blumer, of New Haven, and others.

8 P.M.—Address by the President of the Congress, Reginald H. Fitz, M.D., LL.D. To be followed by a reception.

Wednesday, May 8, 3 P.M.—'The Comparative Value of the Medical and Surgical Treatment of the Immediate and Remote Results of Ulcer of the Stomach.'

DR. JOHN H. MUSSEY, of Philadelphia, Pa., and DR. CHARLES G. STOCKTON, of Buffalo, N. Y.: 'On the Indications for, the Methods of, and the Results to be expected in the Medicinal Treatment.'

DR. WILLIAM J. MAYO, of Rochester, Minn.: 'On Surgical Treatment of Acute Ulcers of the Stomach, including Perforations and Hemorrhage'; and DR. JOHN C. MUNRO, of Boston, Mass.: 'On Chronic Ulcers and the Indications for Surgical Treatment.'

Followed by a discussion by Mr. B. G. A. Moynihan, of Leeds, England; Dr. A. Jacobi, of New York; and others.

Thursday Evening, May 9, 8 P.M.—Smoker.

THE permanent commission of the International Seismological Association has resolved to hold a competition for the construction of

a seismometer recording the movements of the soil during earthquakes which have their origin near the place of observation. The instrument must satisfy the following conditions: (1) It must be able to register both horizontal and vertical movements. (2) It must be of simple construction. The record must give a magnification of not less than 40 to 50 times. (3) The selling price of the instrument, with the registering apparatus, must be as low as possible (\$75 approximately). Four prizes are offered, having the respective values of about \$250, \$175, \$125 and \$75. The instruments must be sent at the expense and risk of the competitors to the Vice-president of the Association, Dr. J. P. van der Stok, De Bilt, Netherlands, before September 1, 1907, and are to be exhibited at the general meeting of the association which will be held at The Hague during the month of September. The efficiency of the instrument will be investigated at the Central Bureau, Strasburg, and the awards will be determined by a jury composed of five seismologists chosen by the permanent commission. The results will be announced at Easter, 1908. For further particulars apply to Professor G. Gerland, director of the Central Bureau, Strassburg i. E.

DURING the past season, Dr. W. W. Atwood began an investigation of the more important coal fields of Alaska. This work will probably occupy at least three years and will include (1) a broad study of the coal-bearing formations with the aim of correlating the coal horizons in the different portions of the territory, (2) a comparative study of the coals, including the sampling for analysis of all workable coal seams investigated, (3) estimates of the amount of coal available, and (4) a study of the methods of mining and marketing Alaskan coals. The plan for the first season was to visit the Contoller Bay and Cook Inlet coal fields. The early part of the second season, 1907, will probably be spent in southeastern Alaska, but most of that summer's work will be done in the interior. It is expected that during 1908 the studies along the coast will be resumed and pushed westward so

as to include all important coal fields on the Alaskan peninsula and neighboring islands.

THE secretaries of the organizing committee on the union of medical societies having their headquarters in London, have written to the *British Medical Journal* as follows: Twelve societies have decided to join the union, namely: British Electro-Therapeutic; British Gynæcological; British Laryngological, Rhinological, and Otological; Clinical of London; Dermatological of Great Britain and Ireland; Dermatological of London; Epidemiological; Neurological; Odontological of Great Britain; Obstetrical of London; Pathological of London; Royal Medical and Chirurgical. Four societies are willing to join under certain conditions, namely: British Balneological and Climatological; Laryngological of London; Otological of the United Kingdom; Therapeutical. In the case of some societies, such as the Anatomical of Great Britain and Ireland, the Physiological, the Medico-Psychological, and the Medico-Legal, there are peculiar difficulties, but the members of certain of these societies have indicated their willingness to form similar sections in the new society. Five societies have definitely refused to join the union, namely: Life Assurance Medical Officers' Association, Medical Society of London, Ophthalmological Society of the United Kingdom, Society of Anæsthetists, Society for the Study of Diseases of Children. The first meeting of the representatives of the societies which are forming the union will be held at 20 Hanover Square on Friday, January 18, at 5 p. m.

THE U. S. Geological Survey has published a report by Messrs. C.-E. A. Winslow and Earle B. Phelps of their investigations on the purification of Boston sewage. In an introductory chapter written by Professor William T. Sedgwick the explanation is made that an anonymous friend of the Massachusetts Institute of Technology had, in 1902, presented to that institution the sum of \$5,000 a year for three years, for the purpose of making experiments on sewage purification and of giving the widest possible publicity to means or methods by which the present too often crude and imperfect systems may be improved.

It was decided to establish a sanitary research laboratory and sewage experiment station on the main trunk sewer of the south metropolitan system of the city of Boston. Professor Sedgwick was made director of the work, Mr. Winslow was installed as biologist in charge of the laboratory and station, and Mr. Phelps as research chemist and bacteriologist. The report now made by them is not final, for experiments are still in progress, the donor of the original gift having consented to continue the work for the fourth and fifth years.

UNIVERSITY AND EDUCATIONAL NEWS

ANNOUNCEMENT has been made that Mr. John D. Rockefeller will endow the University of Chicago with \$3,000,000 to maintain a pension fund, the institution having been excluded from the scope of the Carnegie Foundation, owing to its denominational control.

It is also reported that Mr. Rockefeller has agreed to give \$2,000,000 for the endowment of a university for Louisville, provided a similar amount is raised by those interested in the new institution. A plan has been practically agreed upon whereby the University of Louisville will unite with the proposed universities of the Baptist and Methodist churches, and property now occupied by the House of Refuge will be donated by the city as the site for the university. The Methodist church has already at hand \$250,000. The Baptist church has promised \$260,000, and the University of Louisville has pledged for over \$200,000.

THE chair of chemistry at the University of Pennsylvania, held by Dr. Edgar F. Smith, vice-provost of the university, has been anonymously endowed by a gift of \$100,000.

MR. SAMUEL W. BOWNE has given to Syracuse University, of which he is a trustee, a chemical laboratory, costing \$100,000.

THE packing interests of Chicago have offered to the University of Illinois the sum of \$250,000 with which to establish in that city a veterinary college.

THE vice-chancellor of the University of Cambridge announces recent contributions to

the benefaction fund: £5,000 from the Goldsmiths' Company to the library; £2,500, part of the sum received in response to the appeal on behalf of the library; £1,600, resulting from the general appeal of the Cambridge University Association to general university purposes; £904 for the building fund for the new Museum of Archeology and Ethnology. Also subscriptions of £12,325 (including £5,000 from the Drapers' Company, and £1,000 each from six individual contributors) towards the building fund of the department of agriculture.

GLASGOW UNIVERSITY has received £6,500 from Mr. John S. Dixon, to raise the lectureship in mining to the status of a chair; and £5,000 from the Graham Young trustees towards the endowment of a lectureship in metallurgical chemistry.

THE professorship of pure and applied mathematics in the University of Otago is vacant. Particulars can be obtained from the High Commissioner for New Zealand, 13 Victoria Street, London, S.W.

PROFESSOR B. E. FERNOW, formerly director of the New York State College of Forestry at Cornell University, has been appointed to organize a forest department in the State College of Pennsylvania on the same lines as the Cornell institution, making it a first-class undergraduate forestry school.

MR. J. F. BREAZEALE, of the Bureau of Soils, has been appointed assistant professor of experimental agronomy at the Pennsylvania State College. He will make a study of the rotation fertilizer plots which have been conducted by that station for twenty-four years. Mr. C. L. Cook and Mr. F. R. Reid have been assigned by the Bureau of Soils to assist in these and make other soil investigations. Mr. C. F. Shaw has been appointed instructor in agronomy and Mr. J. H. Barron assistant in experimental agronomy.

PROFESSOR ERNEST RUTHERFORD, Macdonald professor of physics in McGill University, has been appointed to succeed Professor Schuster as Langworthy professor and director of the physical laboratories at the University of Manchester.